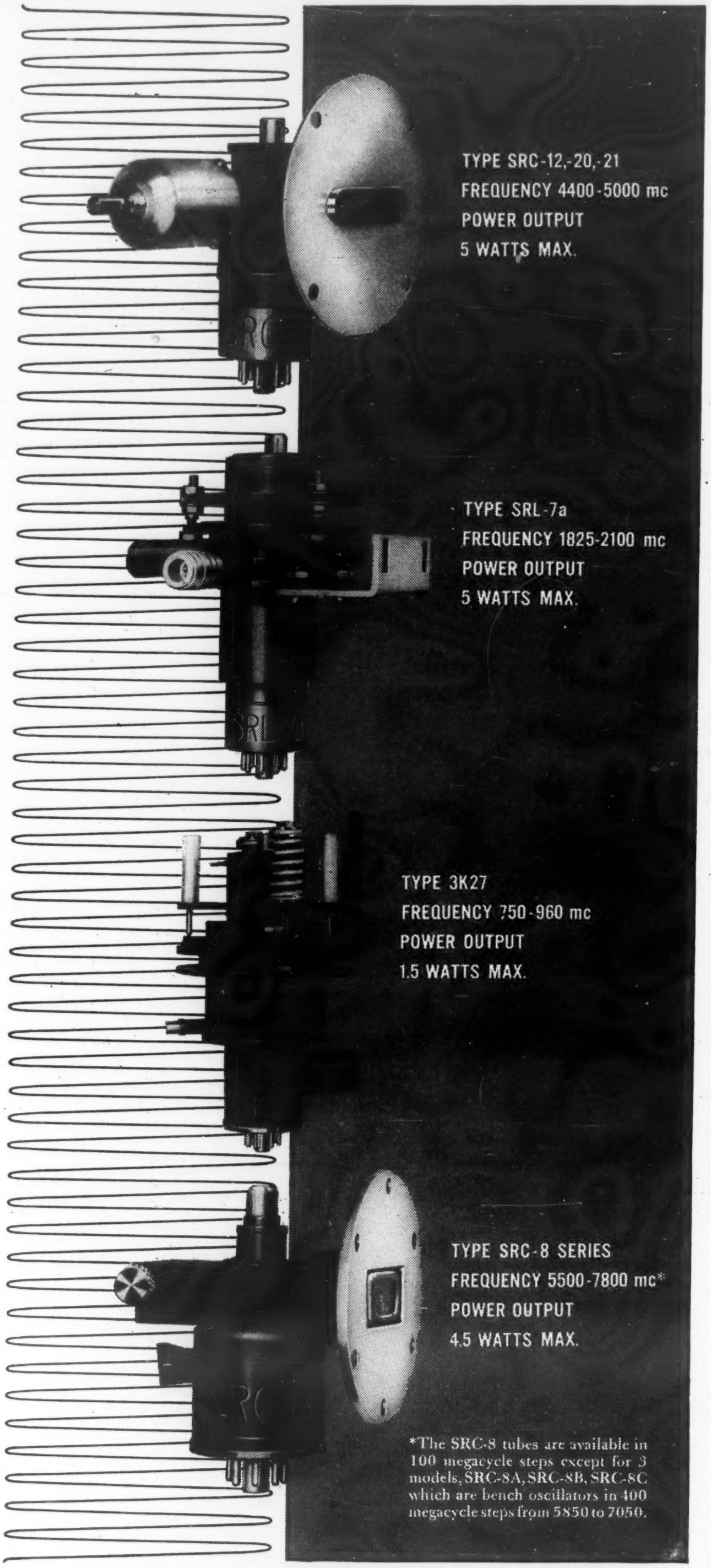
MILITARY

SIGNALS

LAND ★ SEA ★ AIR

VOL. 2 NO. 3 JANUARY-FEBRUARY, 1948

Missouri's Signal Bridge



new klystron tubes

NOW AVAILABLE FOR MICROWAVE RELAYS

■ Four Sperry Reflex Klystron oscillators for microwave relay systems are now available for commercial use. These Klystrons can be used either as transmitting types or local oscillators. They can also be used in the laboratory as bench oscillators in the development of microwave relay systems.

■ With these new Klystron tubes, relay techniques are simplified and the mechanical problems associated with lower frequency relay links are overcome.

■ Other Sperry Klystrons are available in the frequency range from 500 to 12,000 megacycles. Our Industrial Department will gladly supply further information.

SPERRY

SPERRY GYROSCOPE COMPANY

DIVISION OF THE SPERRY CORPORATION, GREAT NECK, N.Y.

NEW YORK · CLEVELAND · NEW ORLEANS
LOS ANGELES · SAN FRANCISCO · SEATTLE

1947

"Was that a Busy Year!"

We completed the largest construction program in our history—more than twice as large as any pre-war year.

A billion dollars was put into new facilities for the expansion and improvement of your telephone service.

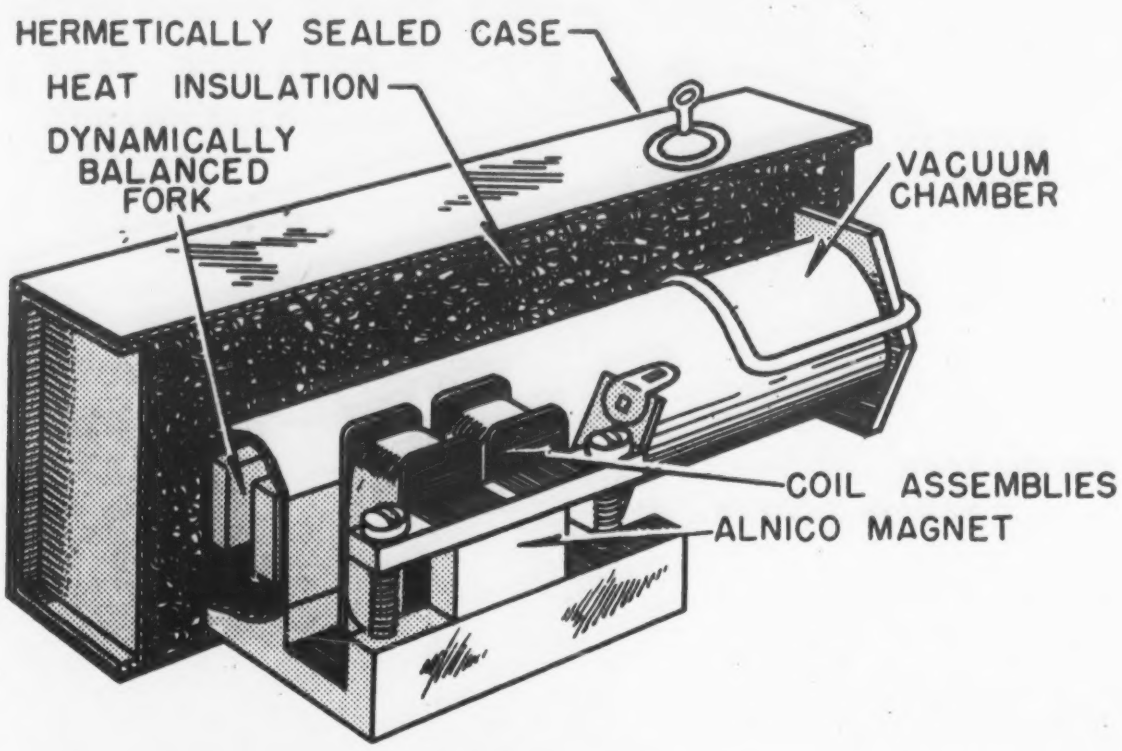
2,700,000 new telephones were added to the Bell System—more than 10,000 every working day.

13,000,000 more calls a day were handled—a new record.

The telephone story of 1947 is one of expanding business, extraordinary building of new facilities, rising costs and higher payrolls.

It is the story of unceasing effort to meet the continuing demands for more and better telephone service.

BELL TELEPHONE SYSTEM



Here's laboratory precision in a rugged, compact, portable unit!

PRECISION STANDARD FORK OSCILLATOR

A Fork Oscillator for those who require a ruggedly durable and faultlessly accurate portable constant audio frequency source. Now available in limited quantities . . . as a separate unit or complete with power supply in a cabinet, or relay rack mounted. Price range $300-$500. Cabinet model shown here.

To meet the exacting demands for constant speed in portable facsimile equipment, Times Facsimile Corporation has developed a fork-controlled oscillator which its engineers believe surpasses any of its kind on the market.

Temperature compensated fork sealed in a vacuum. *No oven necessary!*

Frequency Stability—one part in five million per degree Centigrade, from 0°C. to +65°C.

Insensitive to changes in barometric pressure, humidity, and line voltage 90-130v. 50-70 cycles.

Times Facsimile Corporation manufactures oscillator units for any specified frequency between 60 and 4,000 CPS.

TIMES FACSIMILE CORPORATION

229 West 43rd Street, New York 18, N. Y.
a subsidiary of The New York Times Company

MILITARY
SIGNALS
LAND ★ SEA ★ AIR

Journal of the Armed Forces Communications Association — Dedicated to Military Preparedness

VOLUME 2 JANUARY-FEBRUARY, 1948 NUMBER 3

CONTENTS

FEATURES

DEPARTMENTS

Picture credits: All pictures Official Army, Navy, or Air Force photos unless otherwise credited. Photos on pages 15, 19, 20, and 21 courtesy Radio Corporation of America.

Now that SIGNALS is the journal equally of all the communications Services the cover colors will alternate with successive issues between the different Services. The cover colors used approximate the official Service colors as closely as standard printing inks will allow.

SIGNALS is published bi-monthly by the Armed Forces Communications Association at 804 17th St., N. W., Washington, D. C. Entered as second-class matter at Post Office, Washington, D. C., September 6, 1946, under Act of March 3, 1879. Additional entry at Baltimore, Md.

Subscription rates: 1 year (6 issues), $4.00. To foreign post offices, $6.00. Printed in U.S.A. by Monumental Printing Co. at Baltimore, Md.

The publisher assumes no responsibility for return of unsolicited manuscripts or art. Authors are responsible for opinions expressed in articles.

When sending change of address, please list both the old and new addresses and allow 3 weeks for delivery of first copy.

The Cover

As long as there have been men-of-war, signal hoists have been needed to get rapid orders to nearby ships. In our cover picture the *USS Missouri's* signalman, receiving his instructions by phone, hoists a fire control signal.

REAR ADMIRAL EARL E. STONE, U.S.N.
Chief of Naval Communications

NAVAL COMMUNICATIONS

Material for this article was furnished by the present Chief of Naval Communications, Rear Admiral Earl E. Stone, assisted by Capt. R. J. Foley, U.S.N.

WITH THE wider scope now proposed for "Signals" and in view of the expected addition of naval articles to the pages of this magazine, it is appropriate that we become a bit more closely acquainted with Naval Communications.

The following remarks are intended primarily to serve as an introduction to those readers of "Signals" who are for the first time coming into contact with the Naval branch of communications. For the many readers who have already met and worked with the Naval Communciations Service, it is hoped that some new angles will be developed or gaps will be filled in.

Be assured, we are not dealing here with information that will have to be unlearned as the unification of the armed forces progresses. For communications by its very nature, has always not only lent itself to, but actually demanded, constant attention to the integration and correlation envisaged in the National Security Act. Since any concerted action by two or more people or agencies requires the exchange of thought, a common "language" is essential. The story of the Tower of Babel is the biblical recognition of this fact. Translating this into military terms, the United States Army and Navy, well before the overall unification was conceived, realized that their common task of National Defense demanded rapid, secure and reliable communications between all elements of all branches of the three services. For this reason, the communication arms of the military services have for many years been studying (and implementing) the coordination of effort and the inter-service organization that now puts them well ahead in carrying out the spirit of the Unification Act.

Hence, for purposes of communi-

The USS *Ancon*, pictured above, is one of the U. S. Navy's AGC's (Amphibious Force Flagships) which were literally "Floating Headquarters" for many Allied invasions in World War II. Designed to serve as communications centers the AGC's are outfitted with complex and up-to-date communications devices, including the latest radar equipment.

These ships were the nerve centers of assaults, coordinating through high-ranking passengers —the Admiral in command of the seawise aspect of the operation, and the Commanding General of the Army or Marine troops employed—all the diversified problems encountered.

The *Ancon* served as "Floating Headquarters" for the Sicily and Normandy invasions.

Messages received over the weather and hydro circuit at Naval Communications are perforated, checked and transmitted over the Navy radio network.

cations, we may say that this unification is at most an intensification of a project that has long been underway.

Basically, the Naval Communications Service permits the effective exercise of Naval Command. Its mission is to provide an adequate means of communication at all times, first to serve operational command, and secondly for command administrative purposes. This requires, not only within the naval operating forces at sea and in the air, but also ashore, an adequate system of rapid, reliable, and secure communications.

Communications has been aptly termed "the responsibility and tool of command." The commander being responsible for the effective employment of his forces, is given certain essential tools to assist in his task. One of his most useful tools is his communications system. It enables him to transmit orders and intelligence rapidly, reliably and securely to the various elements of his command and to receive from them and from other sources reports and information. In other words, the commander is furnished a voice and ears, and becomes responsible for their efficient use. Should his battle or campaign be lost through failure of his communications, the responsibility would be his. As the efficient carpenter does not blame his tools, but rather keeps them ready for effective use, so the commander must realize that complete control of communications is essential to his effective exercise of command.

As the speed of movement of each element of a military force increases, and as the scope of operations expands, the dependence of the controlling commanders upon his rapid communications also increases.

The history of Naval Communications may be considered to commence with the Revolutionary War Prior to that time, silence ruled between ships of the American colonies. Seagoing forces seldom had reason to communicate with each other, communications being limited to those few signals necessary for distress, recognition, and instructions for ships meeting or in company. At the outbreak of hostilities, however, when privateers and other vessels joined to form a Continental Navy, additional communication procedures were born, of necessity.

It is recorded that in 1778, the Continental Marine Committee distributed to our "fleet" the first general instructions for making a few simple maneuvers and recognition signals. It was 19 years later, however, when a signalling system originated by Captain Truxtun, was officially recognized and printed. The official Naval Signal Book written by Captains John Barry and James Barron, the forerunner of the present Naval General Signal Book, was brought into use in 1800, retaining the basic system introduced in the Truxtun book.

No office within the U. S. Naval establishment was made responsible for signals until 1824, when the Secretary of the Navy officially assigned the duty to the "Navy Board of Commissioners," but no important changes were adopted in communications until dictated by the ominous rumblings preceding the Civil War. The Navy then used the newly established commercial wire telegraph system to communicate with its units in various ports, but did not establish a system of its own. As various officers "went South" and joined the Confederacy, signals were compromised, and the Bureau of Navigation, which took over cognizance of Naval Signals in 1862, decided that the Navy would adopt the Army system of signals. Consequently, instruction in the "Myers Code" was included in the curriculum at the Naval Academy.

The next significant change was the establishment of the Navy Signal Office under the Bureau of Navigation of 1869. That office issued a new signal book, but the system remained basically unchanged.

By 1875, the Navy was experimenting with electric lights for signalling, and the following year they were read at a distance of six miles

by means of the "Machine," an electro-magnetic device constructed by Prof. M. G. Farmer. Use of the flash lamp method, perfected by Lt. W. N. Wood, which permitted signals to be read at a distance of 16.9 miles, followed in 1878. Thereafter, rapid technical advancements in communications soon threw the Navy's development program off balance. The Bureau of Navigation being unable to cope with technical aspects, its Navy Signal Office was abolished, and the Naval Bureau of Equipment was assigned responsibility for communication experiments and development work.

On March 15, 1898, the Secretary of the Navy issued orders to the President of the Naval War College, to institute planning for the establishment of a coastal signalling system on the Atlantic and Gulf Coast. From this skeleton plan were to grow the present Coast Guard light house, weather reporting and life-saving systems.

Soon afterward, the then seemingly incredible method of transmitting signals by wireless came into being and Marconi was invited to experiment under U. S. Naval supervision. Confidence in the new procedure was mirrored by the fact that by 1900 recommendations had been made to install "Marconi devices" aboard several Naval vessels.

With the dawning of the Twentieth Century, the Navy awakened to the vast potentialities of "wireless." Stations were erected at Washington and Annapolis to test methods and various types of radio equipment. In 1902, a board was appointed to determine the type of apparatus best suited to the needs of the Navy and certain tests were made:

(a) Between the Washington and Annapolis stations;
(b) Between Annapolis and a moving ship in Chesapeake Bay; and
(c) Between two ships at sea.

So successful were these transmissions that major vessels of the fleet were ordered equipped with "Slaby-Arco" radio equipment (of German design), and additional shore stations were ordered to be established.

In the fleet maneuvers of 1903, the radio was given a practical test with encouraging results. The value of wireless in Naval Operations as thus proved, convinced many of the more progressive-minded Naval Officers that wireless apparatus should be installed on all ships of the U. S. Navy. Six experimental shore wireless stations were built, and a special training school was established at the Navy Yard, New York.

With the outbreak of World War I in Europe, the Navy took action on the possibility of our becoming a belligerent. A special board was appointed to study communications and to recommend measures necessary to put the Naval Radio Service in a state of readiness. The board's report led to General Order No. 226 of 28 July 1916, and the establishment of the Naval Communications Service under a Director of Naval Communications. The first director, Captain William H. G. Bullard, was made directly responsible to the Chief of Naval Operations. This office has been continued, but the Director is now known as the Chief of Naval Communications.

When the United States entered World War I in 1917, the President directed that the Navy Department take over control of coastal stations necessary to Navy Communications and that all radio stations not necessary to this end should be closed. The pattern of control of communications then was somewhat similar to that followed during World War II, for the Navy not only controlled communication stations aboard ships at sea and in port, but also the communications to our merchant ships. General Order No. 367 of 14 February 1918 was issued to establish responsibility for the administration and operation of the shore communication system under the Director of Naval Communications.

The new radio industry grew rapidly, and the need for control and regulation became evident if in the future the wireless of the Navy was to become a practical and efficient medium of communications. President Theodore Roosevelt took action to meet the situation by appointing a board to study supervision of the air waves. The group recommended a three-part control system—Army control of interior military stations; Navy control of coastal military stations; Department of Commerce control of commercial stations.

In 1912, Congress passed legislation providing for the regulation of radio-telegraphy. One noteworthy feature of this legislation was the Navy's obligation to open its facilities to commercial traffic. As usage of radiotelegraph increased so did the need for improving its effectiveness—by modernization of the Navy's coastal stations. This in turn required an expansion in the administration of Naval Communications, and resulted in the establishment of the Office of Superintendent of Radio under the Bureau of Navigation in 1912. The technical aspect of radio was then an assignment of the Naval Bureau of Steam Engineering.

In accordance with Navy General Order No. 240 of 1912, the "Naval Radio Service" was established when the Act became effective on 13 December 1912.

Congressional legislation in 1915 created the Office of the Chief of Naval Operations (CNO) and in the

---

Born in Milwaukee, Admiral Stone received his early education there, and completed a year at the University of Wisconsin before entering the Naval Academy in 1914. With the wartime class of 1918 he was graduated from the Academy in 1917 and served during the war on the USS *Cleveland*. After the war he set out on his career in communications, receiving instruction in radio engineering at the Academy's Postgraduate School, and at Harvard University, where he received a Master of Science degree in 1925.

After further instruction at the Navy Department's former Bureau of Engineering, he joined the USS *California*. In October 1926 he was transferred to the USS *New Mexico*, serving as aide and division radio officer on the staff of the Commanding Admiral, Battleship Division 4, of the Battle Fleet, until July 1928.

In August 1928 he began duty in the office that was eventually to become his own command—the Office of Naval Communications, Office of the Chief of Naval Communications, at Washington. After two years of duty there he went back to sea again, serving as aide and communications officer on the staff of the Commander in Chief of the U. S. Fleet. Another two years at the Office of Naval Communications, and again back to sea he commanded the USS *Long* for two years and the USS *Aylwin* for one year. Thereafter he returned to the office of the Chief of Naval Operations, serving as Communications War Plans Officer, and as the Naval Member of the Coordinating Committee of the Defense Communications Board until February 1941, when he once more joined the USS *California*, this time as Executive Officer. He was with the California until that battleship was damaged in the Japanese attack at Pearl Harbor.

In October 1942 he reported for duty as Assistant Director of Naval Communications. In February 1944 he was ordered to duty in charge of fitting out the USS *Wisconsin* and commanded that battleship from her commissioning April 16, 1944 until March 1945, when he was transferred in the rank of Commodore to duty as Assistant Chief of Staff for Communications on the Staff of the Commander in Chief, Pacific Fleet, at Advanced Headquarters, Guam.

On January 23, 1946, Admiral Stone reported for duty as Chief of Naval Communications.

Annual Report of the Secretary of the Navy appeared the following: "The Naval appropriations act of 1915 provides that—there shall be a CNO who shall be charged with—the operation of the Radio Service and other means of communication," and, "The Radio Service has been reorganized and the Office of Communications has been established in the Department." This latter statement apparently indicates the inauguration of the Navy Department communication office as it is recognized today in the Office of the Chief of Naval Communications.

Between World War I and World War II, the Naval Communications Service continued to expand and endeavored to keep pace with developments in the communications field. As Hitler marched into Poland in 1939 and a global war became imminent, the Naval Communications Service took stock of its facilities and prepared once again to play its essential role as the nerve center of the Navy at War.

Very little has been written about the role of the Communication Service in the Navy's great war achievements during World War II. There were two reasons for this silence. First was the necessity for military security during war times, and second, communications are so closely integrated with every other activity —ashore, afloat or in the air—that it is difficult to point out any one feature and say "Communications did *this* or *that!*" Nevertheless, the Naval Communications Service did much of vital importance which contributed to our success in World War II.

The Naval Communication Service can very aptly be called the "nerve system" of the Navy. Its primary objective is to furnish an adequate means of rapid communications at all times for all essential purposes throughout the Navy. During World War II the accomplishment of this objective required great expansion of the Naval shore communication system, plus augmented facilities within all naval operating forces (ships, airplanes and amphibious units).

Commencing its expansion in 1939, to keep pace with changing conditions in world affairs, the Naval Communication Service developed its facilities to such an extent that at the peak of the war effort, one of the largest and most extensive communication systems in the world had been established. This system employed all known means and methods of rapid communications, including radio, visual, landwire, cable, radiotelegraph, radioteletype, radiotelephone and radiophoto. These expanded facilities enabled our vast and diverse Naval forces to operate effectively whether afloat, in the air, or on our far flung battle fronts. Needless to say, when this task was completed, the Naval Communication Service reduced its size to that necessary for peacetime service and training.

The distances and speeds involved in warfare require that every ship, airplane and station, large or small, be equipped with one or more of those methods of communication, and of course in most cases, following military custom, there must be stand-by methods for communicating when the primary method is shot away or otherwise rendered inoperative.

A type of ship developed during the recent war is the headquarters ship (or AGC). These vessels are literally crammed with electronic facilities. They served well in meeting our essential command communication requirements in opening the roads to Berlin and Tokyo. They were the answer, for example, to the needs of a commander in conducting large scale landing operations involving Army and Marine troop units, Army and Navy aircraft, and the many types of naval surface and sub-surface vessels.

The press, it will be recalled, was right in there, giving the American public practically a play-by-play description. Press needs were often met by the AGC equipment also. A few years ago, we would not have thought it possible to operate so many radio circuits in one ship. Nowadays, through the technical advances of the electronic science, the typical AGC has more than 60 radio transmitters and more than 100 receivers, and numerous circuits are satisfactorily operated simultaneously.

To fulfill its basic function, communication channels normally follow the chain of command, but there are in addition functional circuits, which cut across the command structure to unite a team in a specific job. Thus, although the line is unbroken from the Joint Chiefs of Staff to the amphibious beachmaster directing the boats in an assault landing, there are special (functional) circuits such as in an air sea rescue mission, when we may have a submarine, airplane, surface ships and shore stations all on a circuit, but not necessarily all in one command.

The well known Task Forces of the recent war utilized communications to the fullest in accomplishing their missions. The Task Force Commander, frequently in charge of surface, air and amphibious groups kept in touch with all elements of his own force and with fleet headquarters. Within the force, use was made of manually-keyed radio, radio-teletype, radio-telephone, flag-hoist and flashing light signals to meet the communication requirements.

Each task group and task unit commander was linked to his own ships and planes. Commanders and individual ships manned certain circuits required by the communication plans. In addition, they listened, to the greatest extent possible with available personnel and equipment, to other circuits. This was to keep the individual commander or commanding officer informed, especially since it is essential that any officer in the chain of command be prepared to relieve his next senior in case that senior is killed or incapacitated.

In wartime task forces composed of many ships, always fully darkened at night and usually traveling at high speed, instantaneous reliable communication is necessary at all times for tactical handling and safety. In this connection, radar also plays a vital role—since radar is important both for our own safety, as well as for offensive action against the enemy. Great reliance is necessarily placed on inter-ship voice radio circuits. Orders are paralleled by a second radio system whenever possible to be doubly sure of accurate reception by fast-moving units.

The fast carrier task force commander can talk to all his commanders in their ships and planes; the carrier air group commander in the air can guide the strike, regroup his planes, or reassign targets as necessary.

In a bombardment group, gunfire support and air bombardment can be fully coordinated and the overall operational plan can be made completely flexible through effective communications.

A destroyer close to the beach has its close fire support directed by a "walkie-talkie" or other portable radio by its assigned shore fire control party. They call for ship gunfire from the front line and get it rapidly and accurately wherever they want it.

With the communications provided, beachmasters give landing craft their beach assignments and precedence, expedite the unloading of the tanks, direct evacuation of the

wounded, and call for salvage parties.

The submarine on lifeguard duty, hears the details of a Navy carrier plane or Air Force strike, takes station to rescue personnel of downed planes, moving when and where needed, being in immediate communication by voice with rescue planes and surface units.

The destroyer radar picket with its combat air patrol overhead, guards the perimeter of the fleet area giving warning of imminent raids and vectoring fighter planes to a point where they can intercept and engage the enemy bombers.

There is *much* conversation—on *many* radio channels. The most thorough training and rigid circuit discipline are necessary for effective communications and to avoid confusion.

In the admixture of ships, planes, merchant ships, inter-service and allied forces—you can imagine the minute communication planning necessary for any specific operation, to match up the communication equipment available, and to assign portions of the radio spectrum to the miscellaneous and complex forces.

All communication channels required must be provided without harmful radio interference. The communication plan for a specific operation can only be successfully prepared based upon a complete knowledge of the contemplated operation, comprehension of the communication requirements and a detailed knowledge of all the communication material available.

The Navy Shore Communication System exists primarily to serve the fleet and our overseas possessions and bases. Together with our fleet communications, it forms a vast and highly organized network.

There are five primary naval communication and radio stations, located at Washington, San Francisco, Balboa, Honolulu and Guam. These big stations are there "To serve the Fleet." Some readers are familiar with the nature of our naval fleet broadcasts as a primary means of delivering messages to ships at sea. The method employed for primary broadcasts requires transmitting each message to ships at sea by the use of several frequencies simultaneously so that every ship, wherever located, and sometimes airships, can copy all messages sent at least on one of the frequencies used. Such a requirement, and the extensive coverage required, necessitates the installation of high-power, low-frequency transmitting equipments as well as a number of high-power, high-frequency transmitters at each of the five primary stations. Secondary fleet broadcasts do not require such extensive or powerful facilities since they are primarily for localized coverage. Broadcast methods are thus used so that ships may receive messages without using their own transmitters. In addition to these two types of broadcasts, primary and secondary, there are a number of local, low-power transmitting facilities required in various areas to disseminate hydrographic and weather information, and time-signals.

Waving a message to other ships of a wartime Allied convoy.

Radio - Washington — our most important shore communication station—consists of a major transmitting station at Annapolis, Maryland, and a major receiving station at Cheltenham, Maryland, with control of all components at the Navy Department. The Washington Communication Office is charged with the operation of the naval shore communication system within the Navy Department and the Washington area. Communication service is afforded the Secretary of the Navy, the Chief of Naval Operations and the several bureaus, boards, offices and other activities in the Washington area, and also affords considerable service to other government departments.

Within the continental U. S., the Navy has landwire teletype circuits, some connecting with overseas bases by Navy radio circuits. Wire teletypewriter circuits extend to numerous parts of continental U. S., to offices of the commercial communication companies, and to many government departments, including, of course, the Army and Air Force. The Navy endeavors to avoid the use of radio within continental United States primarily because of the lack of frequencies, but is prepared to use radio in case of emergency.

As for the Navy leased telephone system—the Navy has a policy of leasing telephone lines only when to do so is more economical than to pay for toll service, unless for tactical reasons it is necessary to have exclusive use of a line even though the amount of traffic might not otherwise justify leasing it.

Navy radio photo activities are now operating as a part of the Naval Communication System. A photo radio net was formed in July 1944, as a part of the Navy public information system for the transmission of action pictures for news services. Continuing peacetime functions of the radio photo activities include a mobile unit for assignment by the CNO wherever needed, such as on Antarctic explorations trips. Shore photoradio installations are now located at only Washington, San Francisco, Pearl Harbor and Guam and are used primarily for radio transmission of weather maps from overseas bases.

During the peacetime period, research, development, planning and training continue in coordination with the Army, the Air Force and the Communication Industry. Simultaneously, training in the efficient use of present equipment is stressed in the Naval Communication Reserve, which has served so admirably in past emergencies.

It is confidently intended that in any future emergency, the Naval Communication Service will be ready to do its share as the "voice and ears of the Navy."

EDITORIAL

THE COMMUNICATIONS INDUSTRY AND OUR ARMED FORCES COMMUNICATIONS

The Armed Forces necessarily depend upon the commercial communications operating companies, both during peacetime and wartime, for certain essential services. Use of leased wire lines is one example. The companies transmit numerous Army, Navy and Air Force messages to destinations where no military communications facilities exist. A close working relationship is required between some of the companies and the Services in the matter of safety of life at sea and in the air. At times, the Services are able to reciprocate—for example, by handling commercial traffic for the companies when their facili ies are unavailable due to natural disasters and certain emergencies.

The cooperation of the commercial communications companies during World War II experienced by the Navy, and by the Army, was of the finest. In the years ahead it will be a great loss to the country if that fine spirit of cooperation is not maintained, and perhaps even improved, by mutual understanding.

The military Services need the advice, as well as the regularly afforded services, of the companies in peacetime emergencies and in planning for service during wartime. Everyone concerned is surely aware of the need today for plans which would be implemented instantly should the Nation suffer an unexpected attack. The pre-establishment of workable communications arrangements is essential in order to avoid delays and confusion in emergencies.

The Services necessarily rely upon the companies for a considerable number of trained communications personnel for wartime service.

It has long been Navy policy to encourage U. S. commercial communications operating companies so that in time of emergency the Nation will have an effective and comprehensive commercial system to support the Government and its military Services. This is obviously a logical policy since the Services cannot maintain adequate national and worldwide communications in peacetime due to lack of funds and personnel. Nor can such a worldwide system be built and manned quickly when war comes. But if there exists a U. S. worldwide commercial system to augment and support our integrated Armed Forces systems, then the Military Services can expect to operate effectively until military communications are established, if necessary.

The companies should find their planning with the Services easier now that the National Security Law is in effect. There is now added emphasis on the common utilization of facilities by the Armed Services. Already there have been prescribed the basic principles for integration of communications facilities of the three Services. The communications needs of each Service will be met either by common use of facilities, or directly by the Service concerned when necessary. Primary consideration is to be given to meeting operational communications requirements of unified command, with due consideration also to meeting administrative requirements effectively and economically. Because of the nature of operational communications requirements, it is not contemplated that control or operation of the major part of the integrated facilities and personnel will be concentrated in any one Service, but that all Service requirements will be met by integrated use without duplication of facilities.

Through the Joint Communications Board, whose membership includes the Chief Signal Officer, the Chief of Air Communications and the Chief of Naval Communications, the integration of military communications will be continued, with future economies probable in frequencies, material and personnel.

Through the Joint Communications Board and the Munitions Board, and with the advice of officials of the various commercial companies, it is expected that plans will be fully perfected in peacetime for the utilization in emergencies of such existing commercial communication facilities as may be required by one or more of the three Services—without competition between the Services for commercial company facilities and services, and with assurance that during emergencies the maximum practicable non-military communications service will continue to be available.

EARL E. STONE
Rear Admiral, United States Navy
Chief of Naval Communications

American soldier uses car track to enable him to use his radio-telephone, much to the amazement of French people looking on in Metz, France.

WARTIME SIGNAL ACTIVITIES HALF A WORLD APART, 1944.

Advanced Marine Signal unit sets up hasty command post in ruins of shattered Jap buildings on Namur.

Pre-battle chow en route to Morotai assault.

MOROTAI INVASION . . . . . .

Soldiers and sailors load LCM's onto a LSD3 in preparation for invasion of Morotai.

oldiers of the 124th Infantry wade in from LCI's to land on the beach at Morotai.

. . . . . PHOTOS JUST RECENTLY RELEASED

Ashore in the opening phases of the assault on Morotai members of a Navy beach party set up communications and erect markers.

Radio and pilot compartments in Navy patrol bomber.

NAVY COMMUNICATIONS AT SEA AND ALOFT

Combat information center, *USS Ancon*, enroute to Sicily invasion.

TELERAN

By W. W. Watts

EVERY one of us has had the experience of being held up in a train while some obstruction, perhaps another train itself delayed, was removed from the track in front of us. This is not to point the finger of criticism at the operators of railroads; their performance in general is extraordinary. Rather it is a reminder that the inability of a train to proceed with safety when its track is blocked is simply a fundamental limitation of railroading. Other forms of transport are not so limited: within the limits of the highway, motor vehicles can turn aside to avoid obstruction; at sea ships can make even wider deviations from their planned path to avoid collision; aircraft have an additional freedom of maneuver in their ability to climb or descend as well as to turn aside in order to continue their flight.

All this is by way of protest against the policy which has been suggested of applying to air transport the methods of traffic control which have given to American railroads such an enviable record of reliability and safety. Granted that these methods would result in safety in air travel, especially after some genius in aircraft design develops a technique for letting a transport airplane pull up to a cloud and to wait for the signals to change, nevertheless this sort of approach to the problem is a little like feeding oats and hay to a team of Eskimo huskies because such a diet produces excellent results with draft horses on Vermont hillside farms. Such transfer thinking is deficient in fundamental analysis of the special capabilities and limitations which are peculiar to flight.

The basic requirement for safe and reliable air travel is that the pilot of every aircraft shall know continuously his position in relation to some planned course, his progress along that course, and the position of any obstruction such as terrain, other aircraft, or even dangerous storms which might introduce danger to the flight. This information must be presented to him with sufficient accuracy to permit him safely to make good

A Glimpse of the Future Possibilities of Electronic Air Traffic Control

FIG. 2

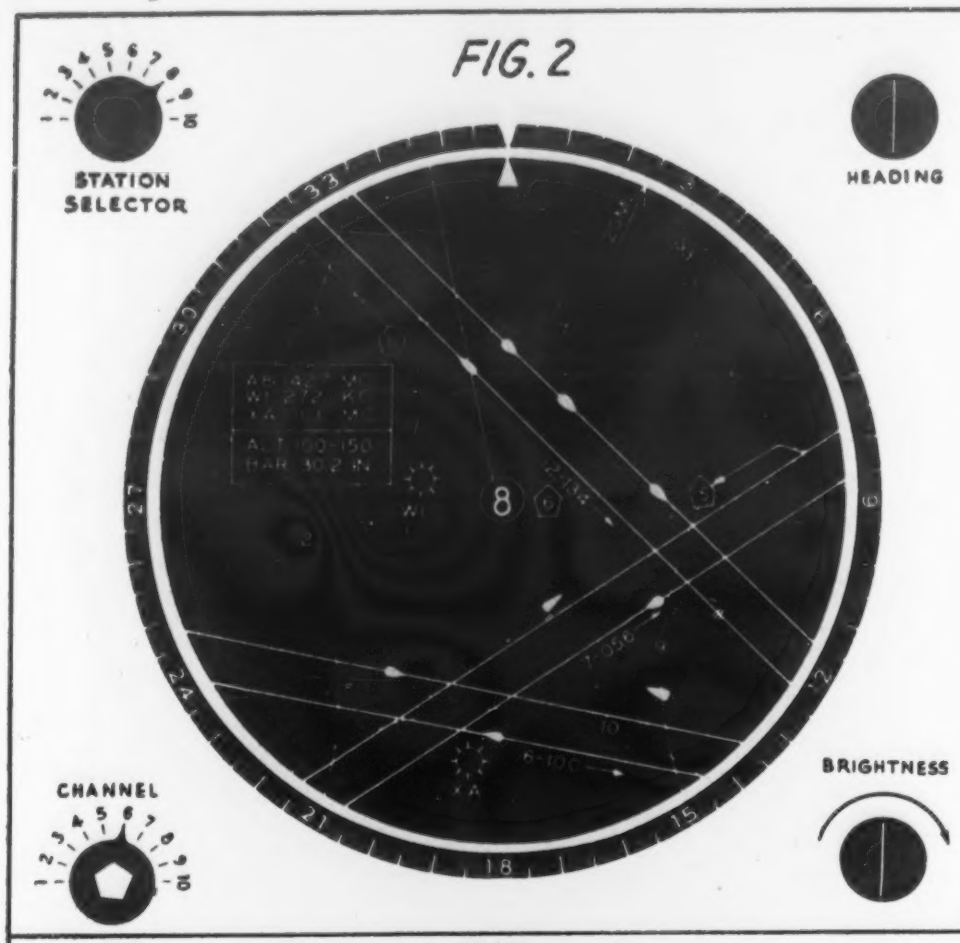


FIG. 3

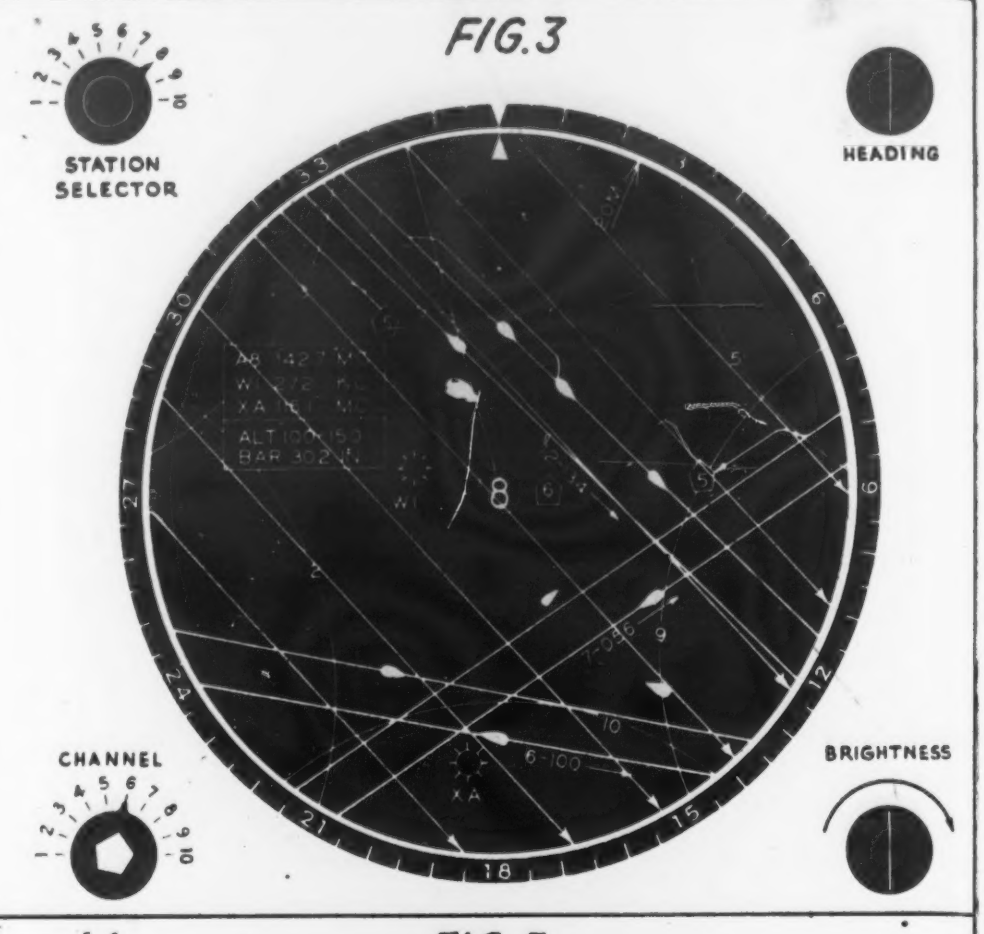


FIG. 4

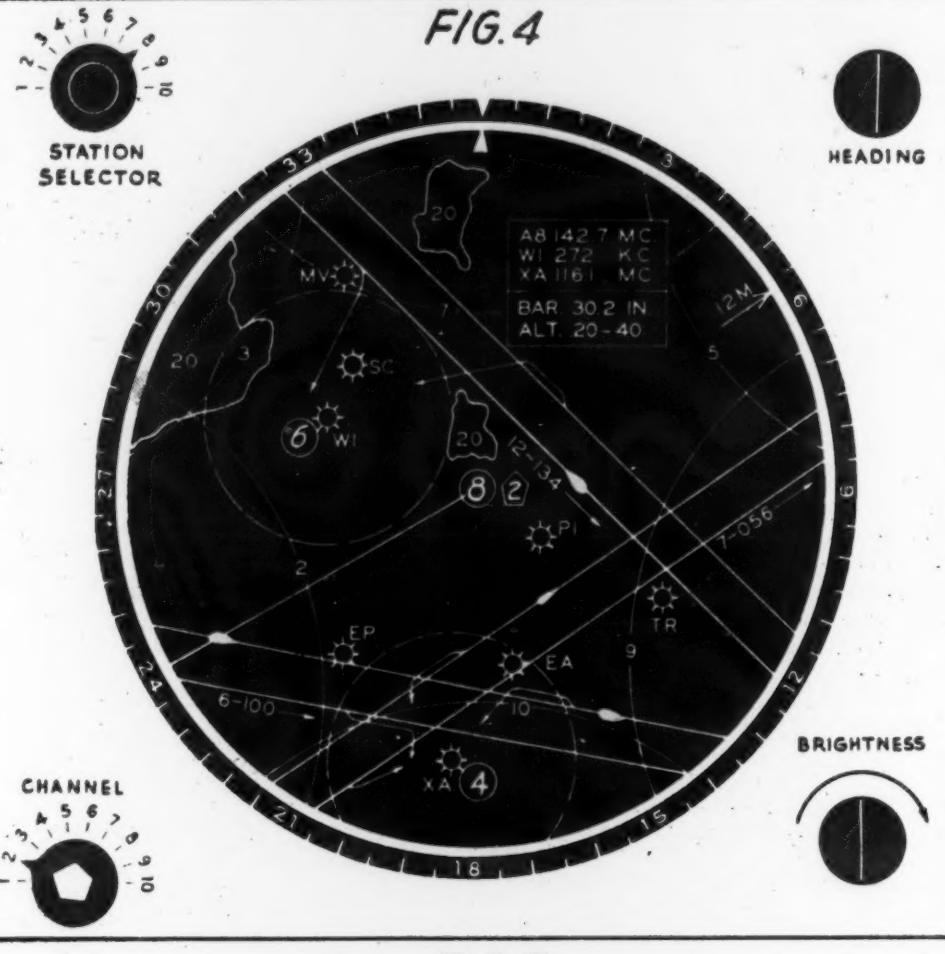


FIG. 5

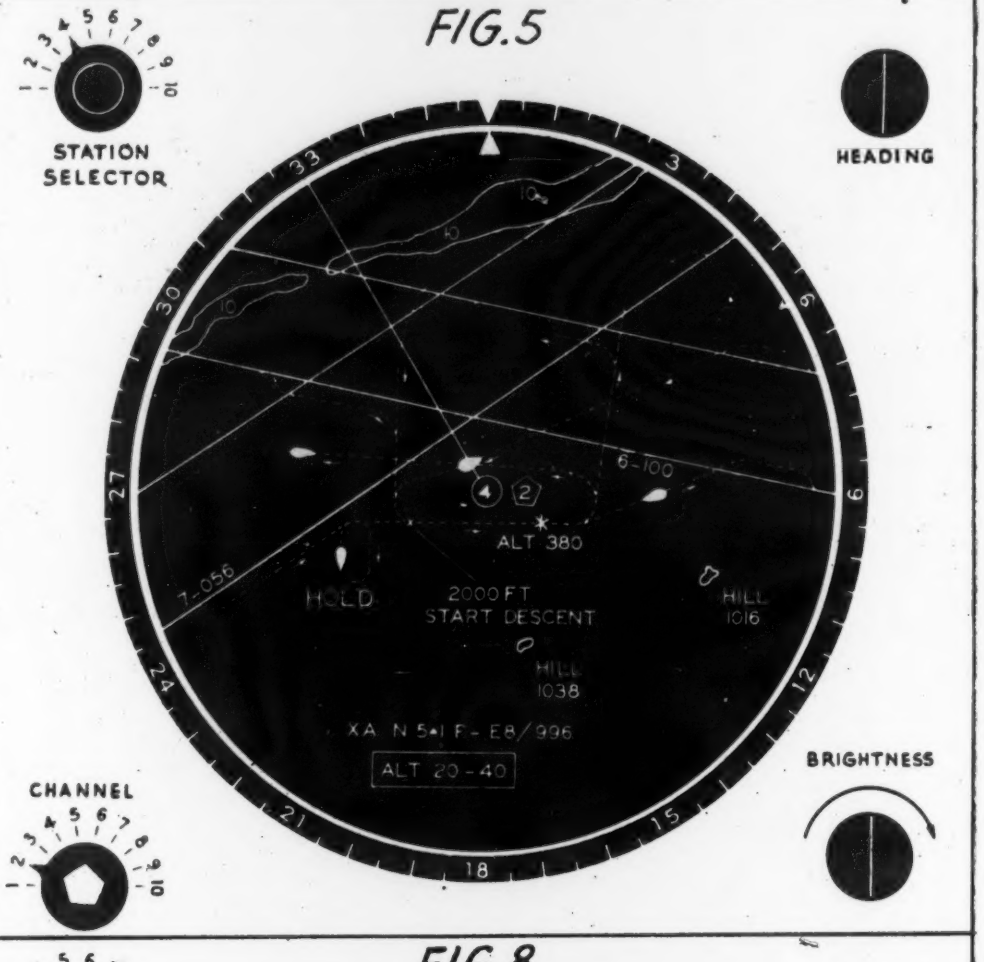


FIG. 7

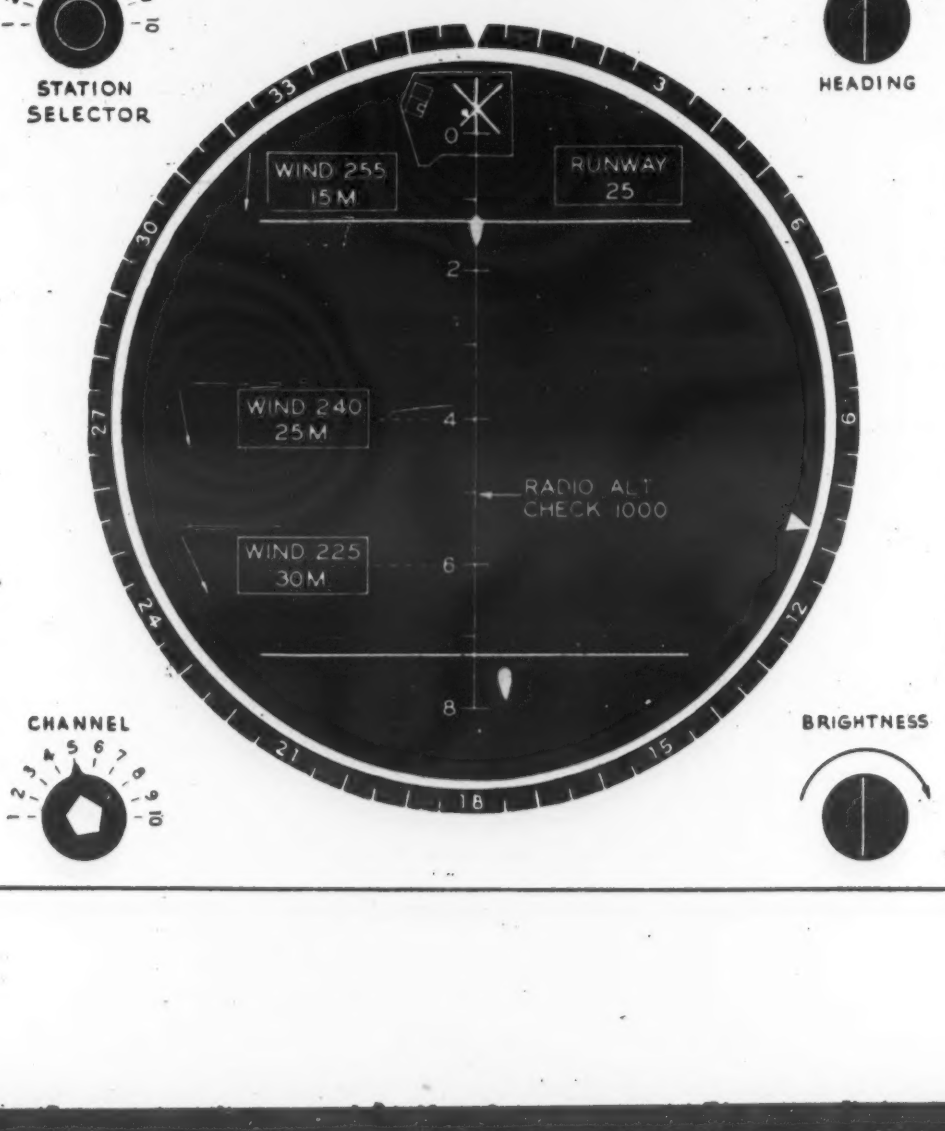
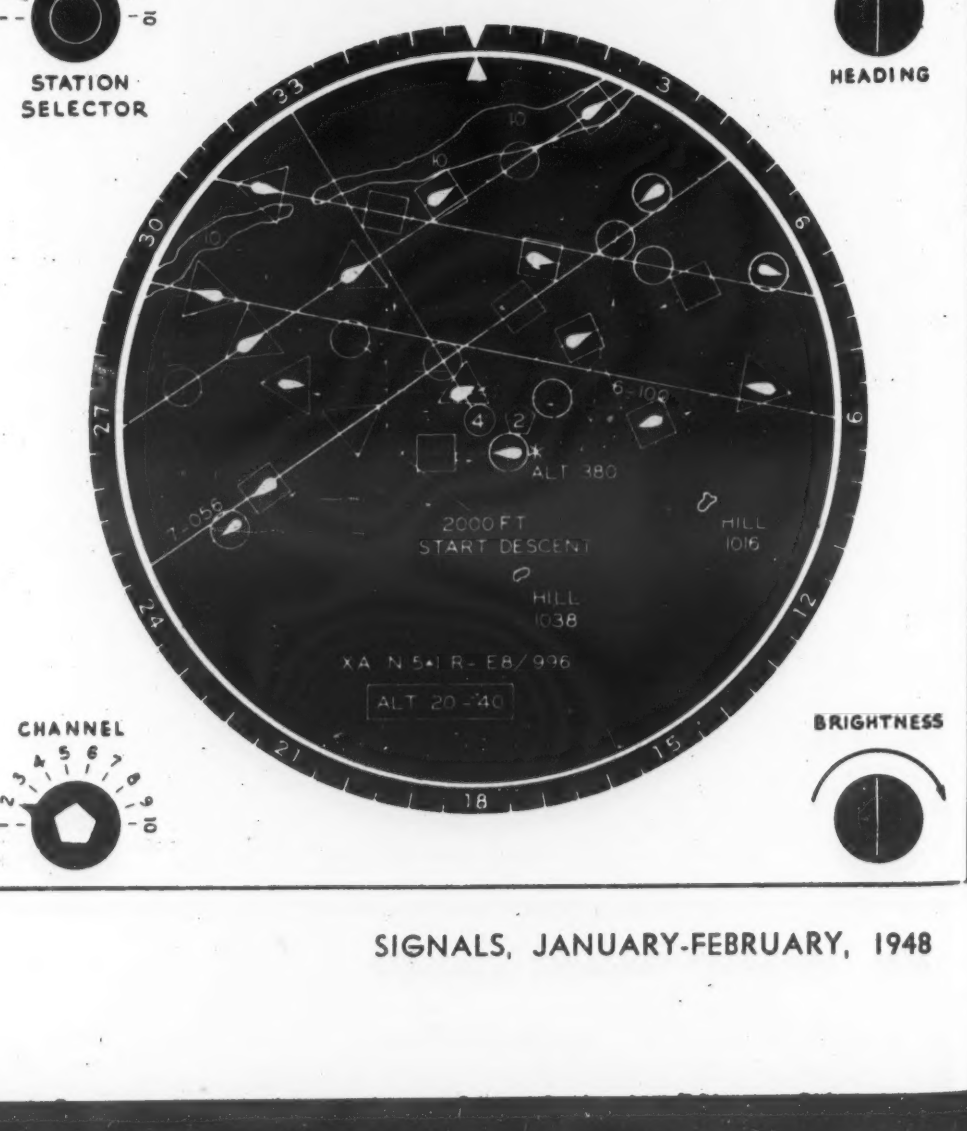


FIG. 8



his planned flight time. It must also be presented in a simple and clear form which will lighten his task which is already heavy. At the same time it is necessary to provide on the ground information which will permit the traffic control agency intelligently to supervise the flow of air traffic and to maintain safety. This is the ideal; it is an ideal which is wholly capable of realization.

Teleran, a system of air navigation and traffic control under development for the U. S. Air Forces at RCA, utilizes television and radar techniques to meet the ideal just stated. Radar collects information regarding the location of all aircraft and presents this information to the ground traffic controller; television transmits the same information aloft to the aircraft. A simple concept, and it is this very simplicity which makes Teleran so attractive; this, and the capability of presenting in directly usable form all the information necessary for all-weather flight in a single instrument.

FIG. 1

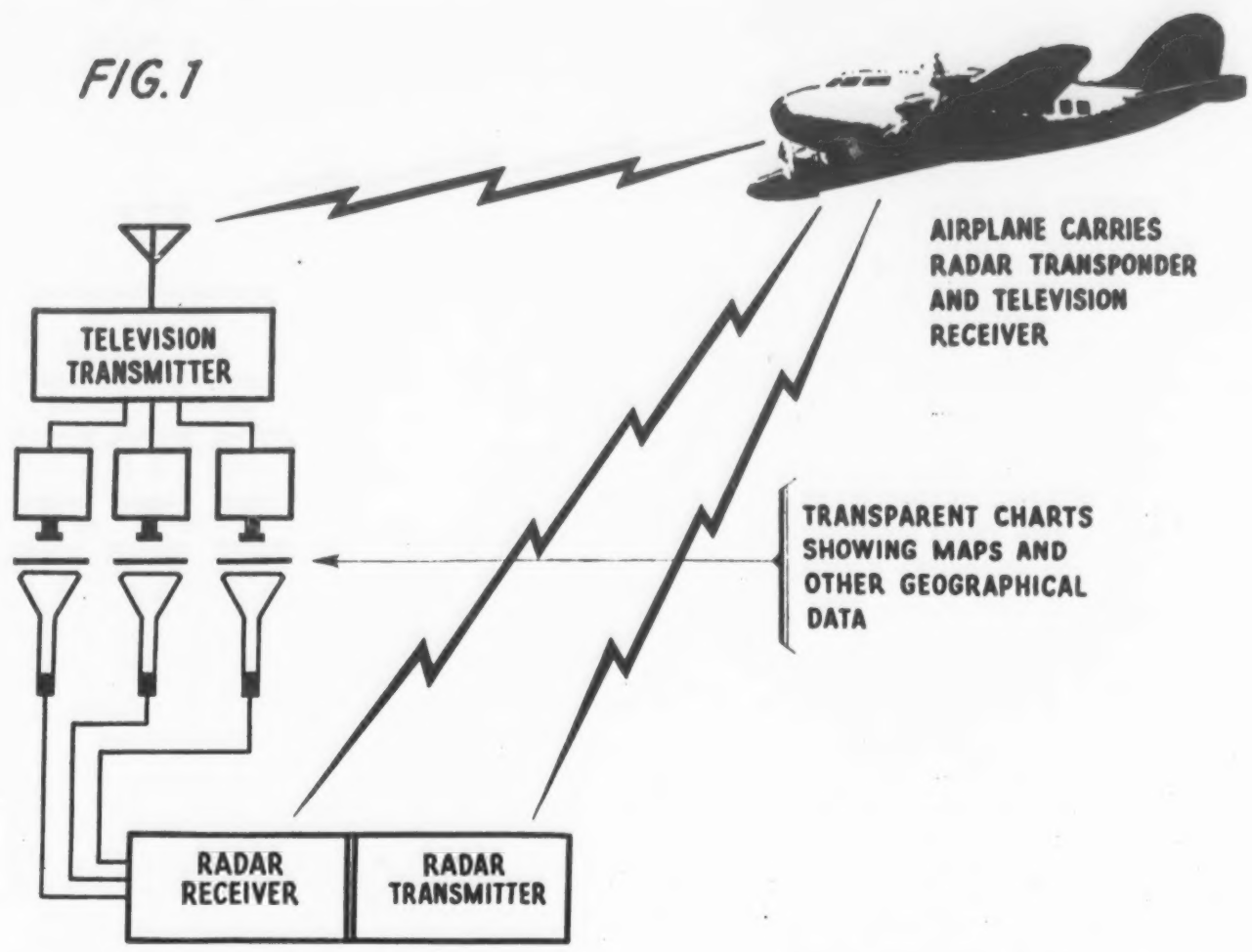


Figure 1.
Schematic Diagram of Teleran System

The drawing of Fig. 1 shows schematically the elements of the Teleran system. Ground radar of the early-warning type sweeps the sky and picks up signals from all aircraft within the range of coverage. Along airways this range would be limited to a 100-mile circle, a limitation set by line-of-sight to aircraft at lower altitude. The aircraft are equipped with radar transponder beacons which reply when challenged by the beam of the ground radar search antenna. The reply is at a different frequency from the search which permits rejection of signals from terrain and storm clouds. In addition it permits the reply signal to be coded from the altimeter so that aircraft at different altitude layers can be displayed on different presentation screens. The technique of coding is, of course, well known, and other information such as identity of the aircraft or of its flight schedule can also be included in the reply of the beacon.

The radar display for each altitude layer is mixed optically with a navigational chart showing all the information required on the ground for the safe control of traffic or in the air for effective navigation. Charts for the lowest altitude layer show features of terrain which might introduce a hazard; at the upper levels such details are omitted and only the important features such as location of airports and the routes of airways are normally shown.

The combined display is scanned by a television camera and the synthesized picture is broadcast aloft by television. For economy of channels, all the altitude layers at each Teleran ground station are broadcast on a single frequency and are separated by time multiplexing. Thus by tuning his receiver to the correct frequency, the pilot of each Teleran equipped aircraft can inspect the entire airspace in a 100-mile cylinder centered on and extending above the Teleran ground station. By proper selection of the time-multiplex band he can study the specific altitude layer in which his flight is located.

In general, each altitude layer will contain several aircraft. It is essential that each pilot be able to identify his own. Such self identification is accomplished by again calling the radar transponder beacon into play.

Figure 2.
Typical Teleran Picture Received in an Aircraft in the 10,000 to 15,000 ft. Altitude Layer.

As the ground radar search beam sweeps by each aircraft, the beacon produces in the television picture a bright radial line which has the same bearing on the map that the radar search beam has in space. Since at that instant the radar beam points at the aircraft, it follows that a line having the same bearing in the television picture will pass through the spot of light representing that particular aircraft. Thus the Teleran chart shown in Fig. 2 is uniquely representative of the picture which would be received in the aircraft flying southeasterly along Airway No. 12. The picture received in the aircraft flying southwest just off Airway No. 7 would be identical except that it would contain a bright radial line passing through the spot of light representing that aircraft in lieu of the line shown in Fig. 2.

Of course there is a statistical chance that two aircraft in the same altitude layer will be for a few moments at the same bearing from the center of the Teleran area. This produces an ambiguity which the pilots can readily resolve. All that is required is for the pilot to turn off his beacon momentarily. During that interval one of the spots of light in his picture will disappear. That spot represents his own aircraft.

It will be noted that the spots of light representing aircraft in the Teleran pictures have been drawn with an air-foil or tear-drop profile. It is a convenient circumstance of the picture-storage characteristic of the radar-television system that the image representing the aircraft persists for several scans of the radar search beam. As the image decays it decreases in diameter, so that the leading edge of the pip is full size; the rear tapers off to a point. Thus the orientation of the tear drop corresponds with the approximate direction of the aircraft travel. Two other gains result from the storage in the system. In the first place the final Teleran picture is free from the random spots and splashes of light which frequently confuse a radar picture. In the second place the picture is very much brighter than the usual radar display.

Electrical noise which produces picture clutter is essentially random in nature; the picture transmitted in Teleran is definite in location and consists only of black and white free from half tones. By virtue of the integrating effect of the storage in the system, much more effective than the integrating effect of the human eye, the final picture displayed in the aircraft has a considerably better signal-to-noise ratio than the original display received by the radar. The second factor of improvement is obtained because the storage characteristic permits the information from the radar to be repeated on the picture tube for very many television scans. This results in a bright, flickerless picture that can be read in the cockpit in full daylight without the use of the conventional radar viewing hood.

Figure 3
Typical Television Display with Heading Lines

We have seen that the orientation of the tear-drop pip indicates the approximate course which the aircraft has made good. In order to hold a course, particularly in the presence of a cross wind, it is essential that the pilot be continuously advised of his heading. This he can get from the compass, but it is more convenient and more emphatically significant if his heading is presented as an arrow on the map which contains his flight rather than as a number on a compass card opposite a lubber mark. To integrate the compass heading with the television picture in Teleran, a transparent plastic disc is mounted in front of the viewing tube. This disc is free to rotate, and is connected through a servo link to the gyro compass. Parallel lines on the plastic disc give the compass heading of the aircraft: numerically by reference to the compass rose surrounding the picture tube, graphically by comparison with the line of intended flight. Thus in Fig. 3 the aircraft is heading 138 degrees in order to make good a course of 134 degrees along Airway No. 12. The 4-degree crab angle is caused by the 20-mile wind indicated on the picture.

Figure 4.
Typical Teleran Chart for Aircraft in the 2000-4000 ft. Altitude Layer

At lower altitudes more details appear in the picture. Hills and ridges extending upward into the altitude layers are included together with the location of normal departure paths from the airways into the traffic pattern at the airport. Figure 4 shows other features which have been included. Sourrounding the airport at Wilkes Barre, Pa., *WI*, and Allentown, *XA*, are dotted circles of 40 miles diameter. In addition adjacent to each airport are identifying numerals *6* and *4* respectively.

Figure 5
Typical Teleran Chart for the Airport Approach Zone

This signifies that these two airports are served by local Teleran stations. It has been stated that the Teleran stations sited along the airways have a 100-mile coverage. With a 7½-inch picture tube in the aircraft, this scale is adequate for en route navigation. For flying the dense traffic pattern in the vicinity of airports, however, an expanded scale is required. Therefore, Teleran stations are installed there having a 40-mile coverage. The picture in Fig. 5 shows what the traffic pattern might look like for such an airport as Allentown. The airport itself is shown near the center of the picture with the location of the runways. With the easterly breeze indicated in the weather sequency displayed at the bottom of the picture, the east-west runway is to be used and the resulting traffic paths are shown in the dotted lines. Should a change of wind require a different arrangement of approach paths, it is simply a matter of seconds to change charts in the mixing panel on the ground. Further, if a temporary condition requires special information to be transmitted to a specific aircraft, it can be written on the chart and transmitted aloft without use of the voice communication channel. Fig. 5 shows such a special instruction being issued to delay the aircraft approaching from Airway No. 7 until the aircraft from Airway No. 6, which is receiving the picture of Fig. 5, has cleared the initial point of the final approach path. As soon as the danger of conflict has disappeared, the special instructions are erased. Thus every pilot sees what instructions have been issued and, by observing the flight of neighboring aircraft, how the instructions are carried out.

Figure 6
Schematic Diagram of Comprehensive Teleran System

Fig. 6 shows how the airway Teleran Station overlaps and correlates with the zone of coverage of the airport station. In this drawing and aligned with one of the runways, the draughtsman has shown a "landing radar." This is the precision azimuth and elevation portion of the GCA. It produces the Teleran picture used in instrument landing.

Figure 7
Typical Tele-an Landing Display

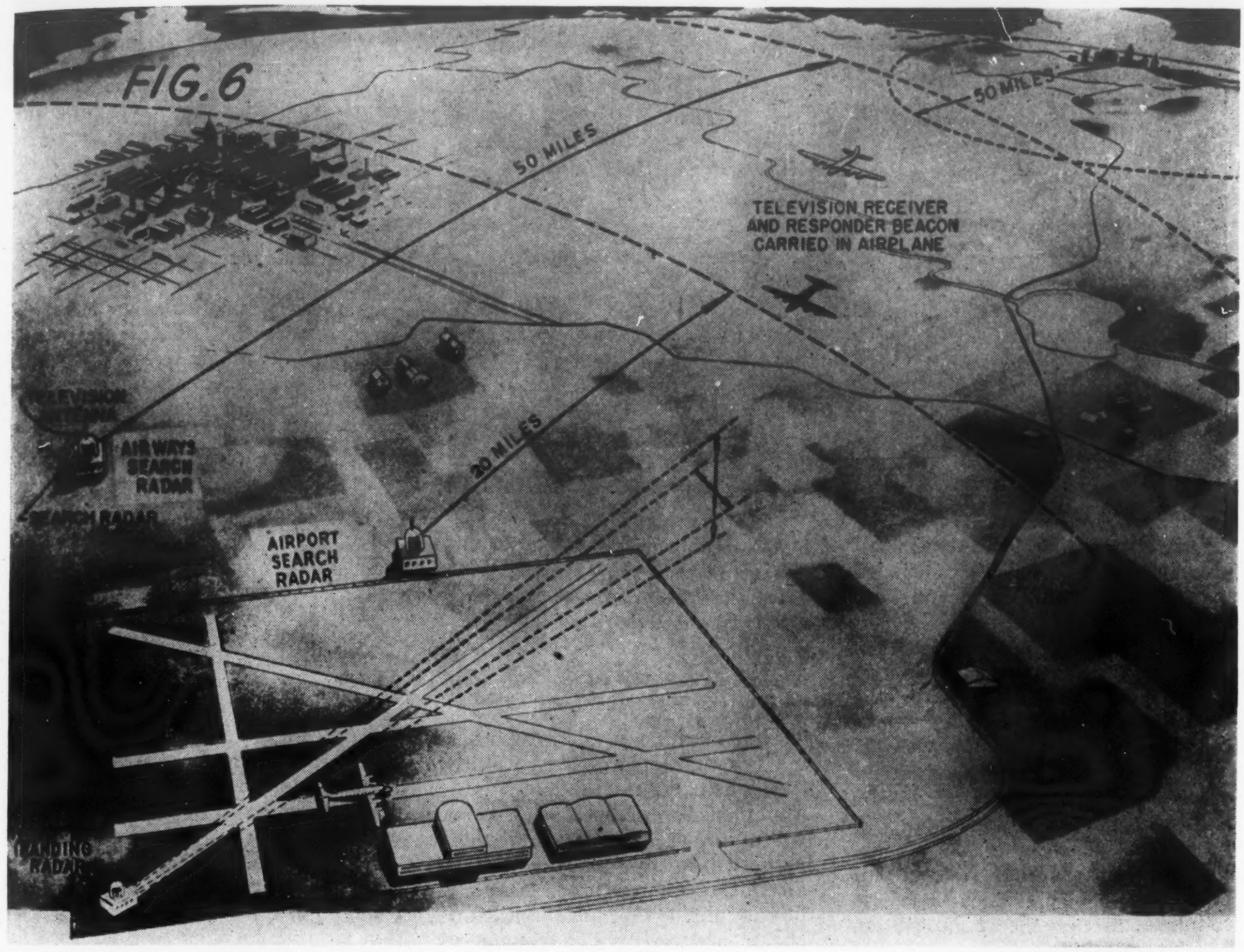
As the pilot sees his aircraft pass the initial point of the final approach path shown on the chart for the airport approach zone, Fig. 5, he switches to the Instrument Landing Picture. Here he sees the whole integrated situation pictorially presented at an even larger scale. The airport is shown at the top of the picture and in some detail. The runway to be used lies along the top end of the vertical diameter of the picture; its center line is extended across the face of the tube which corresponds to 8 miles, approximately one mile per inch. The aircraft is still shown as a tear-drop shaped spot of light, and its position to the right or left of the vertical bright line indicates the error in the azimuth sense during the final approach.

Associated with the spot and drawn by the precision elevation scan of the GCA radar is another bright line. This line is horizontal and indicates the accuracy with which the final approach is being made in the elevation sense. If the aircraft is too high in respect to the ideal approach path, the spot representing the aircraft will lie above the horizontal line indicating that the pilot should increase his rate of descent. If the aircraft is below the standard glide path, the spot will lie below the horizontal line indicating that the rate of descent should be reduced. The task of the pilot is reduced to keeping his spot of light at the intersection of the two lines.

In Fig. 7 the aircraft about one and one-half miles from touch-down is exactly on course in azimuth and in elevation; the aircraft just starting its final approach at the bottom of the picture is too low and a little to the right of his correct position. This pilot should turn left and reduce his rate of descent until he has brought the spot of light to the crossed lines.

The argument over the relative merits of GCA and ILS have been so long and so vigorous that one can only conclude that each method has its merits. This article is no party to the dispute. But it does appear that in Teleran the proponents of each method can meet on a common ground.

Teleran produces in the cockpit of the aircraft the instrumentation necessary for the pilot to make his landing without the intervention of



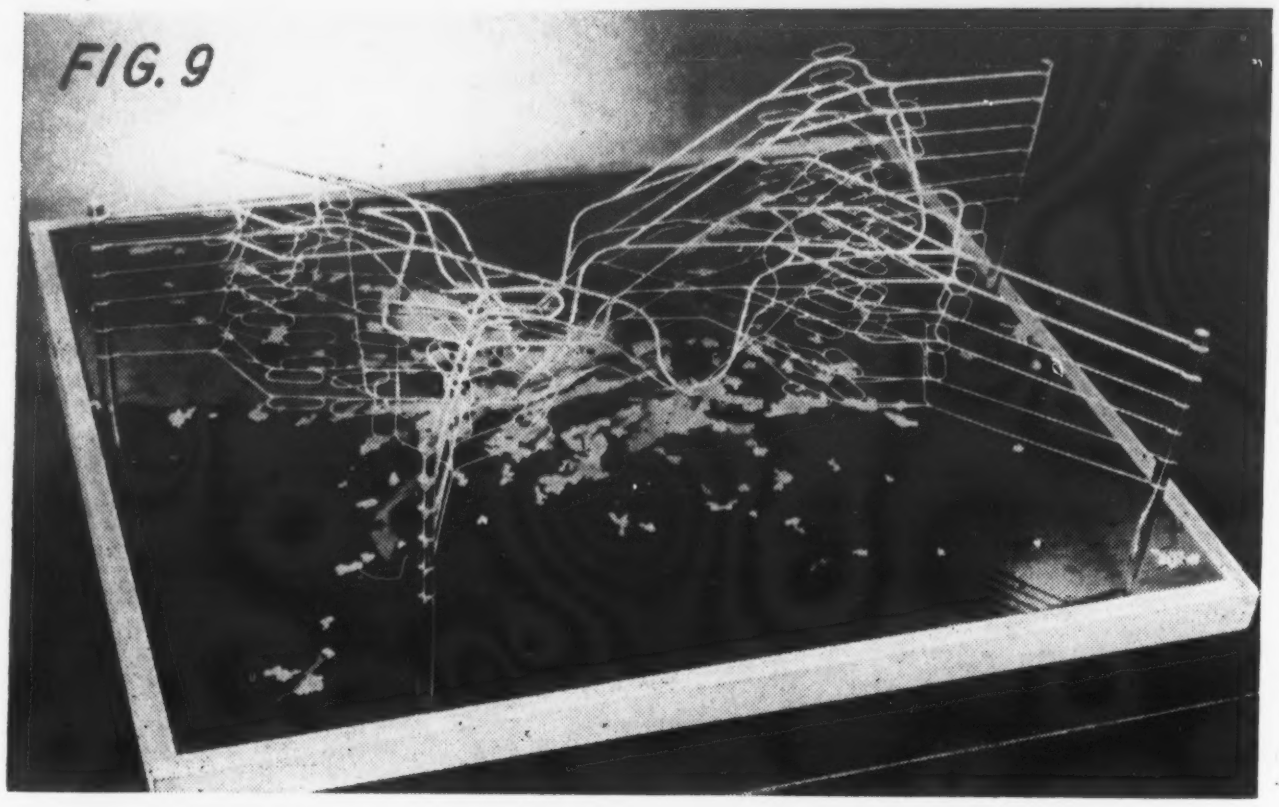
ground personnel. Thus the pilot is not required to act on the judgment of another person to whom he cannot delegate the responsibility for the safety of the aircraft, its crew, and passengers. The requirements of the proponents of ILS are thus met. Further, the same instrument gives him information as to the location and elevation of other aircraft ahead of or behind him on the glide path. This is an important consideration for it is only during the final let-down along the glide path that aircraft must be closely spaced if the airport capacity is to be fully loaded. It would appear to be vital for the pilot to be in a position to know precisely the traffic conditions which he is encountering during this phase of the flight. The supply of this information is a property unique to Teleran.

Teleran also produces on the ground a display which permits the ground personnel to supervise every instrument approach and landing and to "talk down" unequipped aircraft or an aircraft whose equipment has temporarily become inoperative. Thus it provides the advantages of GCA. It would appear that by these dual roles Teleran combines the best of each of the systems which have been under such violent discussion without being subject to the drawbacks of either. Were Teleran adopted, means would be at hand in its instrument approach display to provide automatic landings fully monitored both in the aircraft and on the ground. Automatic landing is a need which is becoming increasingly acute; its effective monitoring will be vital. No other single system provides for both functions.

At the beginning of this article, exception was taken to transferring bodily to air traffic control the philosophy of railroading using fixed block signals and with *hold*, *caution*, and *proceed* lights. Teleran makes such transfer unnecessary and permits a system of automatic traffic control which develops the full capability of maneuver inherent in aircraft. Suppose, for example, that the airport of Fig. 5 was a very busy one with operations running, during peak periods, well up toward the maximum theoretical runway capacity.

Under these circumstances one can expect exactly the same sort of thing to happen in the air space which constitutes the approach zone to an airport as happens on the highways which constitute the approach zone to a football stadium on the day of the big game—a traffic jam. A traffic jam is always annoying and it always increases the hazard of transportation. When the jam is three-dimensional, as it must be for aerial traffic, the annoyance and the increased hazard grow in geometric proportion.

The techniques for straightening out traffic jams are well known. One method widely used for motor vehicles and universal for railroads is to install traffic lights which stop vehicles at critical points until the congestion beyond those points has been relieved. This is a safe, natural process for forms of traffic which are at their safest when at a standstill. The logic of its application to aircraft would be indisputable were aircraft possessed of the capability of remaining safely at a standstill. A modification of the system has been proposed for air traffic; it consists in making



the air space which lies between adjacent signal points large enough so that an airship can circle and hold its altitude while waiting for a permissive signal to proceed into the next block of air space. This system has been widely publicized as the "Fixed block system" of air traffic control.

An alternative system which seems to meet better the special capabilities and the single limitation of aircraft is one in which a single moving block of air space is reserved for each aircraft. This block is caused to move through the traffic pattern along a pre-established path at a speed to which the aircraft can readily be accommodated. Such a system is somewhat analagous to the "wave" system of traffic lights on some trunk thoroughfares, where the lights successively turn green at a speed which matches a safe operating speed for motor vehicles in that particular zone. For air traffic, however, the simple wave system would not afford adequate protection to insure safe navigation through a complicated traffic pattern loaded with dense traffic.

An extension of that system someitmes referred to as a "moving block system" or a system of "flow control" gives a relatively small block of air space to every aircraft as it enters the traffic pattern, with instructions to the aircraft to remain within that block of air space matching its speed and following its direction. The motions of the blocks are computed in advance to match the pattern of the traffic with its dependence on wind velocities and direction and the speeds of aircraft likely to be encountered in the approach zone. The computation having been made and the dynamics of the moving blocks established, a machine can be designed utilizing the well-known techniques of some of the computers which were developed during the war.

Figure 8
Teleran Approach Zone Chart with Moving Blocks for Automatic Traffic Control

This machine would produce on the Teleran displays at each altitude level characteristic figures which would encolse a block of air space within which an aircraft would be permitted to fly. To accommodate aircraft of different speed classes, the blocks might be made with three characteristic shapes moving at different speeds; circles for slow speed aircraft, squares for aircraft of moderate speed, and triangles for the most rapid class of plane. The progress of the moving blocks would be precalculated for various expected percentages of aircraft of the several speed classes; not a critical calculation since the flexibility of such a system would premit a single arrangement of moving blocks to accommodate a considerable range in distribution of aircraft speeds. The dynamic traffic pattern having been calculated, the machine would grind on continously providing a system of steadily moving escalators to bring aircraft from the airways down to the touch-down point, to carry them up from take-off safely into the en route zone.

Figure 9
Simplified Traffic Pattern for the New York Area

With a fixed block signal system it is essential that each block be large enough to permit an aircraft to circle within it if the traffic light into the next block is red. This is no small reservation of air space and, as the speeds of aircraft — and therefore their minimum turning radii — increase, the requirement for air space in each block will grow. Fig. 9 is a photograph of a scale model of a much simplified traffic pattern for the New York area. Only a very few of the required holding courses have been shown. One can easily imagine how complicated the pattern would look if each of the traffic lanes were broken into blocks with holding circles in each. This is the sort of confused arrangement of air paths which results when the limitations which are imposed on air traffic when it is circumscribed by sound railway practice: when a dog-sled team is fed good horse forage. But there are further benefits from an automatic moving block system of traffic control as compared with a fixed block system.

Everyone is familiar with the smooth undelayed manner with which pedestrian traffic is handled by escalators as compared with elevators. The situation as regards air traffic is exactly parallel. Moving blocks permit smooth flow of traffic from the airways to the unloading ramp; circling over fan markers and laddering down stacks are eliminated. This means an economy of operation, since reserves of fuel now have to be carried to permit long holding with possible final diversion to an alternate destination; this extra weight of fuel cuts into the pay-load capacity of aircraft. Further, the increased assurance on the part of the traveling public of arrival at the destination stamped on the ticket at the time printed in the time table will tend to make the increased pay-load come in its most valuable form—revenue passengers.

At this point the operators of aircraft will rise in a body and demand, "What will all this equipment weigh? Can our planes still fly when loaded down with all this mass of apparatus?" The answer is two-fold. We don't know what it *will* weigh. We can, however, tell exactly what the first laboratory models — designed with emphasis on exploring a principle rather than on economy of weight and space — do amount to. Their weight is 140 lbs. complete with antennas, cables, and accessories. Already, as is commonplace with their kind, the engineers would like to make a redesign eliminating 40% of the present weight. It would appear that our friends, the aircraft operators, can resume their seats, can recall the radio receivers of which we were justly proud a decade ago, can compare them with the personal pocket portable of this year's offering, and can make their own estimate

as to what the airborne portion of the Teleran will weigh when the system is ready for standardization.

Actually there is no magic in "so much for so little" in the aircraft. Rather a sound, careful, systems engineering design has placed bulky, heavy equipment on the ground at a relatively few locations and has limited the much larger numbers of airborne equipments to those portions which can be made simple, free from maintenance, light, and compact.

The development of Teleran for the U. S. Air Force has emphasized the systems analysis and design point of view. Its adoption can be equally systematic and orderly. At the Montreal Conference last year, the VHF omni-range and distance measuring equipment were standardized for short-range navigation. In regions of low traffic density these aids are likely to be adequate for some years to come. In regions where there is a large volume of traffic these aids are even now hardly sufficient. Already the operators are calling for ground radar to assist in dispatching and handling heavy traffic flow. Airborne beacons will come next, especially when jet-propelled aircraft, with their small equivalent radar cross-section, becomes more prevalent. From that foundation the step to altitude coding is a short one. The advantage of a bright radar display with a high signal-to-noise ratio will probably draw in some television scanning techniques early in the program so that the creation of the complete Teleran system can be a gradual, well ordered evolutionary process rather than one of drastic sudden change with the associated confusion which is unavoidable in revolutionary changes.

Evolutionary Development of an Integrated System for Air Navigation and Traffic Control

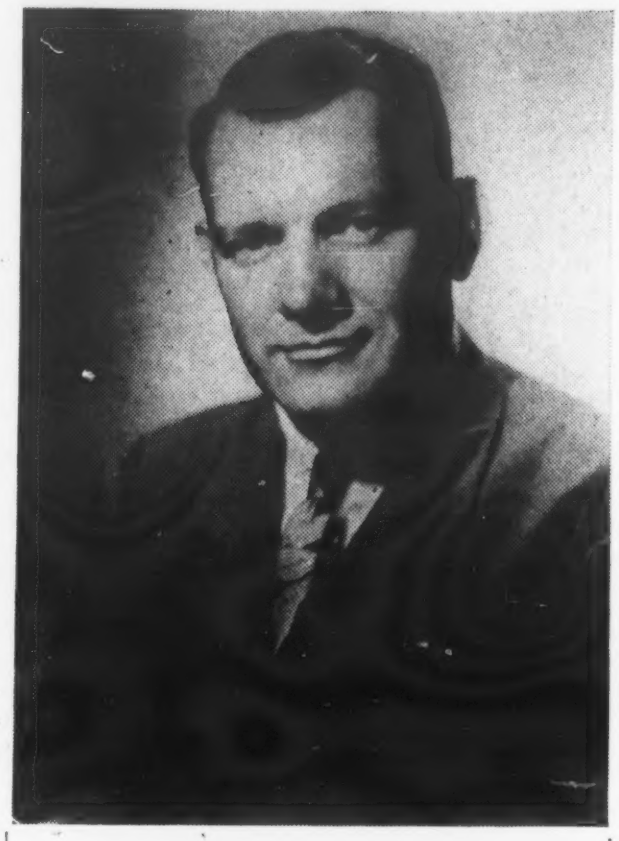
Omni-range and D.M.E.
GCA (At least for Monitoring ILS)
Ground Surveillance Radar
Bright-Tube Radar Display
Airborne Beacons
Ground Radar Display with Altitude Separation
Airborne Television which with foregoing steps constitutes Teleran
Automatic Landing
Automatic Traffic Control
Automatic Identification
Automatic En Route Flight

The above tabulation indicates the order in which the component parts which comprise an integrated system for the solution of the over-all problem of air navigation and of the control of air traffic might be placed into operation.

The naming of the target dates which might be applicable to each item in the tabulation would be an extremely hazardous thing to do. By the time this article is off the presses, however, evaluation flight tests of the basic elements of a Teleran system will be going forward conducted by the Air Material Command. They have been preceded by careful, quantitative tests in the laboratory. The results of these laboratory tests justify high hopes for a full measure of success in the field.

The pictorial character of the Teleran display makes possible the transmission of a vast amount of information to the aircraft without injecting the difficulty of language which is a most trying problem in international flights. For example, weather maps can be broadcast periodically or even continuously on a time-multiplexed channel. Such a facility would have been of immeasurable help to the pilot who, guided by perverse gremlins, followed foul weather from Washington to New York only to save his passengers and crew by heroically ditching his plane in shoal water off Jones Beach. Reliable up-to-the-minute weather maps would have guided him to an open airport while he still had fuel to reach it.

Indeed Teleran can be expected to be a powerful factor in increasing the safety of air travel as well as in improving its chances of meeting flight plans. During 1946 the scheduled and non-scheduled air carriers in the United States suffered 34 accidents which involved fatalities. Of these, five were caused by fire in the air, eight by structure and power plant failures, and four by miscellaneous causes which had little or nothing to do with factors of air navigation and traffic control. The remaining 17—50% of the total—were caused during approach and landing or by collision with terrain while en route. Accidents of this class represent the type which can be corrected by an integrated system of air navigation and traffic control such as Teleran. Furthermore, it is this type of accident which carries the heaviest death toll. Out of the 232 fatalities during 1946, 195, or 84%, were caused by those accidents which were the result of lack of specific accurate information on the part of the pilot as to his location and course in relation to objects of danger. An analysis of these 17 accidents shows that 13 of them, or 76%, would have been prevented by Teleran with a saving of 177 lives.



Colonel W. Walter Watts, President of the Philadelphia Chapter of the Army Signal Association, is Vice President in charge of the Engineering Products Department, RCA Victor Division of the Radio Corporation of America, and a Director of the Radiomarine Corporation of America. He came to RCA after serving in the U.S. Army Signal Corps for three and one-half years.

Colonel Watts was Commanding Officer of the Signal Corps Distribution Agency at the time of his release from the Army and formerly was director of a procurement division of the Philadelphia Signal Corps District. In recognition of his contributions to the procurement and distribution of Signal equipment during the war, he was awarded the Legion of Merit.

Prior to his association with the Army, Colonel Watts was connected with Montgomery Ward and Company, and the Zenith Radio Corporation. At Montgomery Ward and Company, he was mail order sales manager for radio and electronic equipment and major electrical appliances. With Zenith, he held the position of vice president in charge of the Wincharger Corporation, a Zenith subsidiary, located in Sioux City.

Mr. Watts' association with the radio industry began with amateur and experimental work in 1912.

Midway Atoll, with its two small islands, Sand and Eastern, was the last remaining American bastion in the Central Pacific. This was the target for the Japanese Fleet.

JAPAN'S NAVY and the BATTLE of MIDWAY

By Bertram Vogel

Although various excellent accounts of the Battle of Midway, the first great turning point in the Pacific War, have appeared during the years since the battle, accounts have almost invariably been presented from our own point of view. Such a point of view, of course, was not only natural but was actually made necessary by the dearth of reliable reports from Japanese studies of the battle have been made available, and this article is written with the hope that its contents may help round out the story of one of the most fascinating chapters in our remarkable naval and marine history.[1]

At 2300 on 2 June[2] Adm Nagumo, Commander of the First Air Fleet, Japan's Mobile Force, took a last look about him on the bridge of the aircraft carrier *Akagi* and happily concluded that he was a very lucky man. True, the fog was so thick that he could see nothing, and all his ships were being navigated blindly, but Adm Nagumo was the kind of man who depended upon his mind rather than upon his eyes. Besides, if he could see nothing, neither could the enemy. And already his huge striking force was well on its way to Midway.

Returning to his cabin, Adm Nagumo permitted himself the luxury of munificence. He greeted with unaccustomed warmth the junior officer who flattened himself against the bulkhead to make way, and at the entrance to his cabin he nodded pleasantly to the special marine who stood rigidly at attention. It was, after all, not given to every man to play so great a role in the history of his country's navy—and the Admiral knew that this time his country's navy would really outdo itself. While the once-proud Americans continued to patch up the feeble remnants of their battered fleet, he would lead the major and most powerful units of Adm Yamamoto's Combined Fleet to the glorious conquest of Midway. From Midway one would easily be able to control Pearl Harbor, and from Pearl Harbor . . . Yes, the Admiral was quite pleased.

After bowing stiffly to the portrait of the Emperor that hung in his cabin, the Admiral seated himself in his favorite chair. Then, picking up his intelligence evaluation of the situation, he reread it leisurely for the tenth time:

> Because of developments during the First Phase Operations, the enemy's outposts which he had relied on to be his first line of defense, collapsed one after another until he began to feel direct threats even to such areas as India, Australia, and Hawaii. The enemy was exerting every pressure to stem this tide by stepping up his submarine strength in the Australia aera. He employed these to carry on guerilla type tactics. Task force thrusts were also made in the Western and Southwestern Pacific.
>
> These seemed to indicate that the enemy was planning on more positive actions than heretofore.
>
> Subsequent to the beating he received in the Coral Sea on 7-8 May, the enemy was temporarily subdued, but by the end of May—by the time the Fleet was about to sortie from Hashira Jima—the enemy again began to show considerable life in all areas, particularly in the Australia area.
>
> Midway acts as a sentry for Hawaii. Its importance was further enhanced after the loss of Wake and it was apparent that the enemy was expediting the reinforcing of its defensive installation, its air base facilities, and other military installations as well as the personnel.

The Admiral liked a good thing when he saw it, and the estimates of

---

[1]Bibliography for this article includes *The Campaign of the Pacific War, Interrogations of Japanese Officials*, Vols. I and II, and Op Nav P32-1002, "The Japanese Story of the Battle of Midway," prepared by the Office of Naval Intelligence. Op Nav P32-1002 is a translation of Japan's CinC First Air Fleet Detailed Battled Report No. 6, which was a secret document intended only for Japan's highest echelons and therefore presumably frank. It was discovered by the United States after the war.

[2]All dates and times are in Tokyo Time (Plus Nine).

Courtesy: *Marine Corps Gazette.*

Admiral Nagumo led the most powerful units of Japan's Imperial Navy toward Midway Island, confident of an easy victory. Wildcat Fighters intercepted his bomber strike near Midway as Army, Navy and Marine planes destroyed his armada

American air strength at Midway were very much to his liking. There was, according to his information, one squadron of fighters, one squadron of Army bombers, and two squdrons of reconnaissance flying boats.[3] Among the enemy's carriers, the *Ranger* was believed to be in the Atlantic and the *Lexington* either sunk or under repair on the West Coast. The *Enterprise* and the *Hornet* were known to be in the Pacific, but the location of the *Wasp* was uncertain. An additional three auxiliary carriers were also believed to be in the Pacific, but they were definitely slow, and both Adm Nagumo and Adm Yamamoto had chuckled over the absurdity of regarding them as a serious threat.

As far as the American Navy was concerned, Adm Nagumo had scant fears. What opposition could it possibly put up? Indeed, as he paused to re-read his estimate of the situation, he agreed inwardly that there was not the slightest reason to change his impressions. In the first place, he noted, the enemy lacks the will to fight—although he was prepared to concede that the United States might counterattack. In the second place, he assured himself, the enemy conducted his air reconnaissance chiefly to the west and to the south, neglecting a strict vigil to the north and northwest. And of course the Admiral was certain that the enemy knew nothing of Japan's plans.

Other assurances were equally to be found in the Admiral's carefully recorded estimates. Among them was the simple statement—very convincing on paper—that the enemy had no powerful unit with carriers as its nucleus in the vicinity. He concluded that after pounding Midway by air and destroying its shore-based air strength, it would be a simple matter to overwhelm any United States task force which might dare to show itself.

The Admiral grinned broadly. He decided to snatch a few hours of sleep.

[3]This was an unusually sound estimate for the Japanese. In reality, there were 30 PBY's, one Marine Dive-Bombing Squadron of 34 planes, one aMrine Fighter Squadron of 28 Planes, and 21 Army bombers (4 B-26's and 17 B-17's) and 6 Navy TBF's ordered up from Hawaii.

II

The Admiral awoke early the following morning, 4 June Tokyo time, and after a hasty breakfast of light cakes and tea, stepped out on deck to see for himself how much the fog had lifted. Except for scattered clouds, conditions were good and visibility on the surface satisfactory.

During the morning and afternoon, the Admiral's proud striking force steamed ahead. The battleship *Kirishima*, flanked by a fast destroyer and the light cruiser *Nagara*, led the way. Astern of the *Kirishima* were the four carriers, *Hiryu* and *Soryu* to port, and the flagship *Akagi* and *Kaga* to starboard. Flanking the carriers to port were two destroyers and the heavy cruiser *Tone*, and on the starboard side were a similar number of destroyers and the heavy cruiser *Chikuma*. Following were the battleship *Haruna* and five or six more destroyers. It was a huge and formidable task force.

For the most part the afternoon was uneventful. Then suddenly, at 1640, the *Tone*, one of the two supporting heavy cruisers, reported to the Admiral. She had sighted ten enemy planes bearing 160°. Three fighters were almost instantly dispatched by the *Akagi* to pursue the planes, but they failed to find them and returned to the ship promptly. Later, at 2330, the *Akagi* herself twice sighted what presumably were American planes darting in and out of the clouds, and all hands were ordered to battle stations. But Adm Nagumo was actually unperturbed. He recorded in his nothes that he doubted the reliability of the three sightings.

Nevertheless, the Admiral decided to play it safe. Two hours later, at 0130 on 5 June,[4] he issued new orders, and under the command of the *Hiryu's* flight officer, Lt. Tomonaga, 36 fighters, 36 bombers, and 36 torpedo planes flew off the carriers for Midway. A half dozen others were sent out to scout the area to the south and to the east.

Lt Tomonaga's planes took to the air in precise V formations at 12,000 feet, and it did the Lieutenant's heart good to observe how worthy they were of the great mission entrusted to them. Then the Lieutenant jotted down some notes: The weather was cloudy and the amount of clouds, 8. Ceiling was 500 to 1000 meters, visibility about 25 miles. But there was good reason to believe that the weather would be clear over Midway. What more could one ask?

Forty miles from Midway the Lieutenant had his answer. For swooping down from the skies above him were Wildcats.

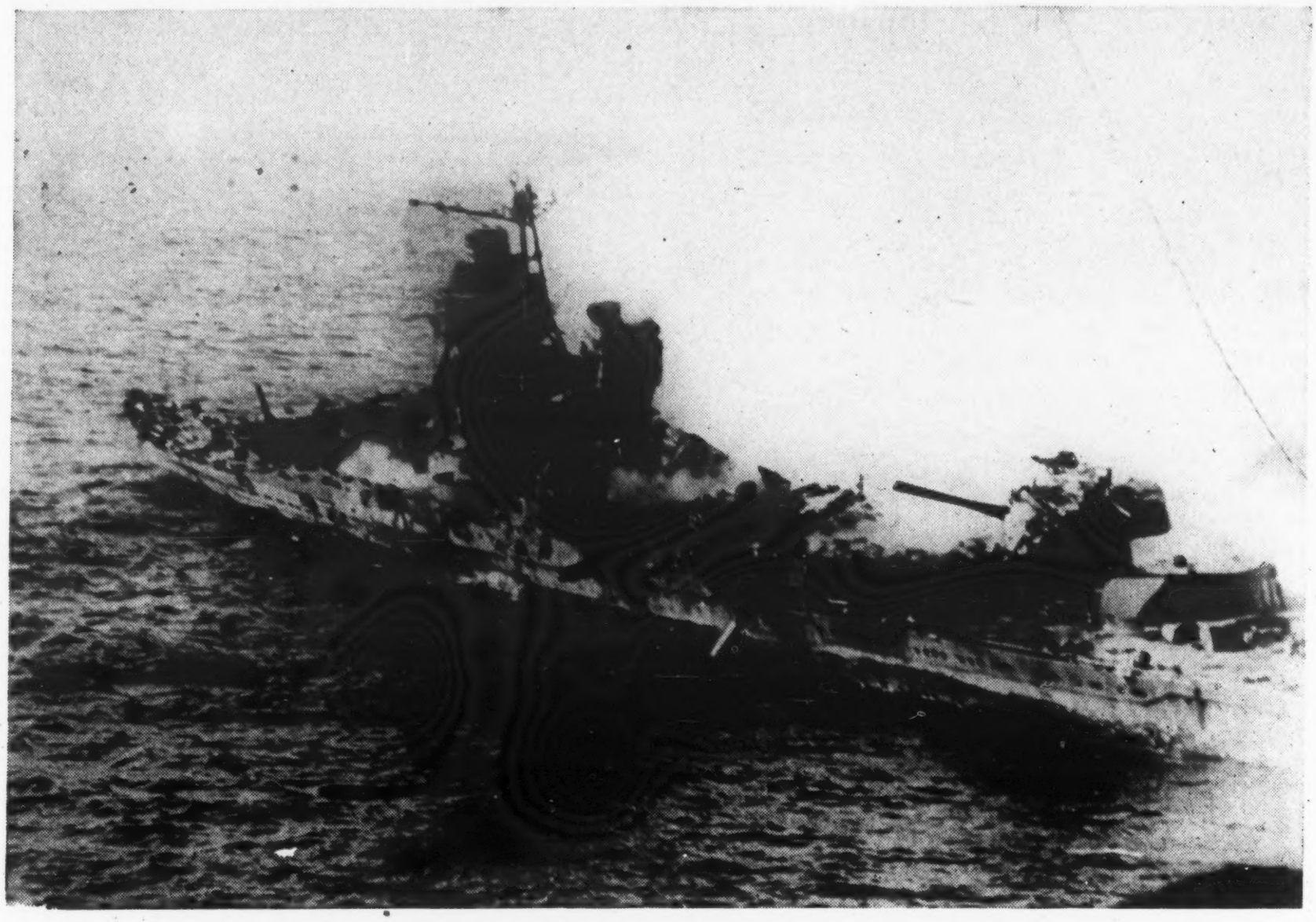
While Lt Tomonaga's fighters twisted and turned to meet them, his bombers, suddenly aware that not every day was to be anther Pearl Harbor, roared ahead for their primary targets on Sand and Eastern Islands. Engaged in furious aerial combat by American Marine fighters undaunted by the hordes of Zero's on their tails, and harassed and of PT boats, they dropped their horrible cargo. A stocky pilot in Squadron 1 was entranced when he saw the bright flames suddenly shoot up from the fuel storage tank at the northern tip of Sand. A moment later he was literally in heaven as an Avenger ripped his fuselage into bits with machine gun fire.

But the Japanese were disappointed. At 0415 the command plane of the *Hiryu* radioed the fleet that it was imperative that a second attack be carried out against Midway. The radioman was quite agitated as he sent the message.

[4]By our reckoning, of course, this was 4 June.

III

Like most Japanese, even those of the very highest echelon, Adm Nagumo did not relish making decisions alone. But this time he was confident. Only half an hour earlier a wave of American planes had commenced a vicious attack against his fleet itself, but the onslaught had been ineflectual. He had ordered a large number of torpedo planes to stand by in readiness for a possible attack by American curface vessels, but now, in response to the request made by his planes at Midway, he was forced to change his order. Troop ships to the southwest were to follow him to Midway. The island would have to be knocked out.



This was the cruiser ***Mogami,*** shelled, battered, and beaten, after colliding with the ***Mikuma.*** The ***Mogami*** limped home but the ***Mikuma*** was finished off by SBDs.

Immediately the ship-based attack planes began the frantic task of removing their torpedoes and replacing them with number eighty land bombs.[5]

In the meantime the Admiral's resplendent striking force had its own troubles. Steaming ahead at 28 knots, it was now preparing to take on its fighters. The *Nagura* and the *Kirishima* continued to lay down smoke screens.

And then, at about 0500, the *Tone's* conscientious reconnaissance plane sent in the message for which the Admiral had been waiting: "Sighted what appears to be the enemy composed of 10 (ships), bearing 10 degrees, distance 240 miles from Midway, on course 150 degrees, speed 20 knots." Half an hour later the Admiral knew the worst. The *Tone's* plane has reported "what appears to be a carrier." The Admiral walked leisurely into his cabin and composed a dispatch for Adm Yamamoto. He concluded that "After taking on the returning planes, we shall proceed north to contact and destroy the enemy task force." It has been said that the Admiral was an optimistic man.

But that was at 0605—and was probably true at 0650, when the *Akagi* recorded that surface units had suffered almost no damage and that the skies were clear of enemy aircraft.

And then, within ten minutes, all hell broke loose. For at 0700 fourteen American torpedo planes, in two groups, roared in from the northwest.

The two groups made directly for the *Akagi* and the *Kaga,* which was astern of her. In an effort to minimize the target area, the *Akagi* turned to course 300 degrees. The *Chikuma* opened up directional fire with her starboard AA, then brought her main guns to bear. The *Tone* hastily dispatched seven fighters to engage the enemy, went into evasive action to starboard, then opened fire.

But while the four carriers desperately maneuvered to avoid the "persistent enemy torpedo planes," the *Kaga* sighted nine dive bombers at 0722. Four minutes later the *Akaga* made a similar observation, but before she could do anything, a direct hit caught her on the after rim of the elevator amidships and another on the rear guard of the port flight deck. The *Kaga,* which had evaded the first three bombs, was not so lucky with the fourth, which smashed her aft, to starboard. And number seven, a direct hit near the forward elevator, was terrific. Glass on the bridge shattered in all directions, and the smoke of the bombs reduced visibility to zero.

But the *Kaga's* captain, who by now had ordered that emergency steering appartus be put in operation, was in a sense quite fortunate that he couldn't see. For if he had, he would have seen the *Soryu* smashed three times within as many minutes—and he would have seen, too, the bomb that hurtled down upon his forward elevator. He was spared that last humiliation. When number nine struck amidship, the *Kaga's* air officer, who had taken over the task of fire-fighting, was about ready to yield. He had the Emperor's portrait transferred to the destroyer *Hagikaze.*

The *Akagi's* plight was almost as bad. One induced explosion after another shook her in succession, and the fire, flaming forward with great intensity from the after quarters, now threatened the bridge. Her skipper. in a desperate effort to avert complete disaster, ordered the ammunition rooms flooded and all hands to fire-fighting stations. But fate, which had been with him in the past, now chose to desert him. His pump system refused to function. At 0746 Adm Nagumo, who had had enough, transferred his flag to the *Nagara.* And at 1038 the Emperor's portrait was similarly removed to the destroyer *Nowake.*

[5]Total weight 805 kg. The other land bomb which the Japanese were then using was number twenty-eight, total weight 242 kg.

For the *Soryu*, struck for the first ime at 0725, disaster was almost instantaneous. By 0730 she was completely enveloped by flames, and by 0740 both her engines had stopped. Five minutes later her commanding officer, Capt Yanagimoto, gave the order to abandon ship. But as his officers and men pushed up on deck to escape the terrible flames, Capt Yanagimoto himself stood weeping on the signal tower to the starboard of the bridge. "Every man to safety," he cried out. "Let no man approach me." As the flames slowly engulfed him, he continued his defiant shouts of *banzai.* And then suddenly a terrific explosion rocked the ship. Men aboard the *Hamakaze* and *Isonami* turned violently away from the sight of the *Soryu's* crew topside hurtling high into space.

From his position aboard the *Nagara,* Adm Nagumo surveyed the wreckage about him. He was low in spirit, but he was not yet crushed. At least the *Hiryu* was left, and he intended to make good use of her. At 0830 he radioed Adm Yamamoto that he still planned to attack before leading his forces north. At 0859 he ordered his ships to assemble and to prepare to attack the enemy. Proceeding on a course of 170°, the tired units crawled ahead at 12 knots.

The *Hiryu's* planes took off with the avowed purpose of destroying the enemy's carriers. And while Adm Nagumo's surface units moved slowly ahead, a second wave soared through the skies toward the enemy. But the Admiral was nervous. It took a message, at 0945, that an "enemy carrier is burning" to calm him. Fifteen minutes later, for the first time since he had left Hashira Jima, he had an inkling of where he stood. He was informed that the *Yorktown*, the *Enterprise*, and the *Hornet* were on the high seas against him.

What course of action Adm Nagumo would have pursued on his own at this critical juncture, we shall probably never know. For at 1010 a secret dispatch from Adm Yamamoto ordered him to attack the enemy fleet. The occupation of Midway was to be "temporarily postponed."

And then once again there was dreadful confusion as one conflicting report after another came in. One carrier plane reported five cruisers and a burning carrier 90 miles away. At an identical time a plane from the *Haruna* had sighted five large cruisers and five carriers which were all afire. And within a few minutes another plane reported that there were definitely three enemy carriers —presumably not on fire. But the *Tone's* number four plane delivered the message that constituted the final straw. The enemy had six cruisers and six destroyers, but 20 miles ahead there was "what appears to be one carrier."

The whole mess was either sheer nonsense or the most miserable sort of duplication and inaccuracy. The Admiral didn't know what to believe. He wished that he were in three other places.

At this precise moment Adm Yamamoto's Chief of Staff chose to query the striking force. He wanted to know whether the Admiral thought it would be possible for friendly units to make use of Midway's shore bases on the following day. It has been said that Adm Yamamoto, too, was an optimistic man.

But the final shock was yet to come—and it came in the form of thirteen American dive bombers which descended upon the hapless *Horyu* at 1403. For four long and intolerable hours the crew battled the fiery inferno, but their efforts were in vain. Fnally, after the last man in the engine room had been literally reduced to ashes, Capt Kaki summoned his men to hear his message. There was an expression of reverence for the Emperor and the shoutings of *banzai,* and then the command and battle flags were lowered. The Emperor's portrait was transferred, and the ship's crew followed in silence. Shortly afterwards the destroyer *Makigymo* finished off the listing *Horyu* with a single torpedo. And much to the consternation of some Japanese in the water elsewhere, the American submarine *Nautilus,* coming out of nowhere, did the same for the dying *Soryu* with three.

At 1530 the commander of the *Chikuma* reported that one of his planes had sighted four enemy carriers, six cruisers, and fifteen destroyers proceeding westward about 30 miles east of the burning American carrier, but Adm Yamamoto chose to take a different view of the desperate situation. His secret dispatch to Adm Nagumo, ludicrous in view of the actual facts, must have made Adm Nagumo's hair stand on end;

1. The enemy fleet, which has practically been destroyed, is retiring to the east.
2. *Combined Fleet* units in the vicinity are preparing to pursue the remnants and at the same time, to occupy AF (Midway).
3. The Main Unit is scheduled to reach position (grid) FU ME RI 32 on course 90 degrees, speed 20 knots, by 0000, 6th.
4. The *Mobile Force, Occupation Force* (less CruDiv 7), and *Advance* Force will immediately contact and attack the enemy.

Adm Nagumo concluded — rather wisely under the circumstances—that Adm Yamamoto was laboring under a misapprehension concerning the enemy. Remnants of the American fleet? The whole thing was absurd. For three hours he attempted, unsuccessfully, to clarify the situation for Adm Yamamoto, but the latter refused to accept the facts. At 1950 he tried once again. Five minutes later he had his reward. He was informed by radio that a new commander, CinC Second Fleet, would take command of the striking force. And at 2355 he was further informed, in a classic of understatement, that the occupation of Midway had been cancelled.

But the new commander was equally unsuccessful. In his hasty retreat homeward he suffered a rather embarrassing loss when two of his best cruisers, the *Mogami* and the *Miku-Tambor.* A group of SBDs and ing to evade the American submarine *ma,* collided heavily while maneuver-TBFs put the *Mikuma* out of her misery, but the *Mogami,* battered and smashed and shelled and beaten, staggered home to safety. She was a peculiarly appropriate symbol of what was to come.

Marine Air Group 22, consisting of VMF 221 and VMSB 231, was the only Marine Corps aviation unit at Midway, when the Japanese struck the island on the morning of 4 June 1942. The fighters intercepted the Jap air armada of 100 carrier planes 30 miles out of Midway and, despite the Japanese fighter superiority of better than two to one, immediately engaged them. Only 12 Jap bombers and fighters broke through to hit the island.

Meanwhile the dive bombers attacked the Japanese invasion navy and scored direct hits on two carriers. Heavy flak and intensive fighter plane action forced a second wave of dive bombers to change their target to a battleship. The battleship was left smoking badly and listing heavily. The invasion was turned back at a terrible price to the Marines. The victory cost 15 fighter pilots, 11 dive bomber pilots, and 12 rear gunners. In return VMF 221 pilots had destroyed 37 and a possible 43 planes. The rear gunners of VMSB accounted for several more, while their pilots had scored direct hits on two carriers and two battleships.

THE SYSTEMS CONCEPT

By Maj. Gen. H. M. McClelland

From an address, "The Commander and his Communications," delivered by Gen. McClelland at the Air Command and Staff School, Maxwell Field, Ala. Gen. McClelland was the Air Communications Officer, Hq, AAF, during the war, and presently heads the Airways and Air Communications Service

THERE IS romance connected with communications, as well as vital military need for them. It would be a pleasure to trace here the romantic side of man's effort to communicate with his fellows, from the time of his first faint fumblings with smoke signals down to the high speed transmission devices of today.

Into the story of his efforts would be woven such dramatic subjects as the first Marathon run, the rumble of jungle drums, the story of the telephone, the saga of the pony express, the epic of Marconi, and the laying of the trans-Atlantic cable.

This is the drama which arouses the enthusiasm for communications which every communicator feels.

However, such a coverage of this extensive field would require much more space than is now at my disposal, and I shall therefore limit my discussion to those matters which I believe to be of great importance to the future of military communications.

Management Problems

THERE ARE three broad aspects with which I believe the future of military communications must be concerned. The first concerns itself with communications management. The second comprises the communications resources of various countries. The third embraces those communications problems which are of interest, not only to the technician, but to the commander, because of the limitations they place on the commander's ability to effect communications.

Naturally there are a good many technical aspects which are of great interest to the technicians, but I shall touch as lightly as possible on such matters, inasmuch as the purely technical phases of communications do not fall within the scope of this discourse.

The subject of communications management is the one with which I should like to deal here, particularly as to one concept of that subject, which the Airways and Air Communications Service calls the Systems Concept.

The Systems Concept preaches two fundamentals: First, that success in operating fixed communications facilities varies in direct ratio to the degree that activities at one location are coordinated and integrated with similar activities at other locations. Second, that coordination and integration, as well as uniformity of operations, are best achieved by establishing the requisite communications facilities as a system at the highest possible command level for the particular situation concerned. This concept modifies somewhat the established doctrine that communications is a function of command.

Under the Systems Concept, communications is a function of command only at the level where the particular communications system is controlled. Whether or not you accept the Systems Concept there must be some provision for management of your communications as an organic whole. If you choose to exercise this management through the normal command channel the commander must delegate sufficient authority to permit the communications officer to exercise a measure of direct control, particularly along technical lines.

It is in this field of management that a good many commanders fail to discharge properly their responsibilities. Too many of them regard communications as a purely technical function consisting of highly specialized equipments and gadgets operated by a weird assortment of technicians. And, not until all commanders are indoctrinated in the necessity for systems management in the field of communications, will our armed forces secure the type of communications which is essential to our success.

AACS Beginnings

THE AIRWAYS and Air Communications Service is an organization founded on the systems concept of which I have been speaking. Before explaining how it operates as a system, I should like to tell you what the Airways and Air Communications Service really is and how it came into being. To do so, I shall take you briefly back to its beginnings.

The AACS, which celebrated its 9th Anniversary on the 15th of November of last year, is the third oldest command in the Air Force, being antedated only by the Air Materiel Command and the Air Training Command. All three of these organizations have, since their inception, existed in their original basic form, though with some alteration in titles.

Now the fact that a custom or method or organization is old is no guarantee of its soundness. There are many old customs and organizations whose soundness might well be questioned. Therefore, just because AACS is the third oldest command in the Air Force, I am not advancing its age alone as an argument for its

continued existence. However, I do think that you will agree that there must be a certain viability and fundamental stability about the concept of AACS when you consider the following points:

First, the AACS was formed before the prewar expansion, hence it may be assumed that its form of organization was appropriate to a peacetime Air Force structure.

Second, the AACS grew from 3 officers and 300 enlisted men—all in the continental U. S.—to a wartime peak of 4500 officers and 46,000 enlisted men, who manned our facilities throughout the world. This was really the test of the organization . . . its ability to expand in time of necessity without fundamental change in its organizational concept.

The third point is that the AACS has successfully weathered the hectic days of demobilization. In fact, its essential strength and soundness of organization have been particularly evidenced by the way in which it has met its continuing commitments since VJ day—commitments not only to the armed services, particularly the Air Force, but also to the U. S. civil airlines whose extension over foreign air routes is in the national interest.

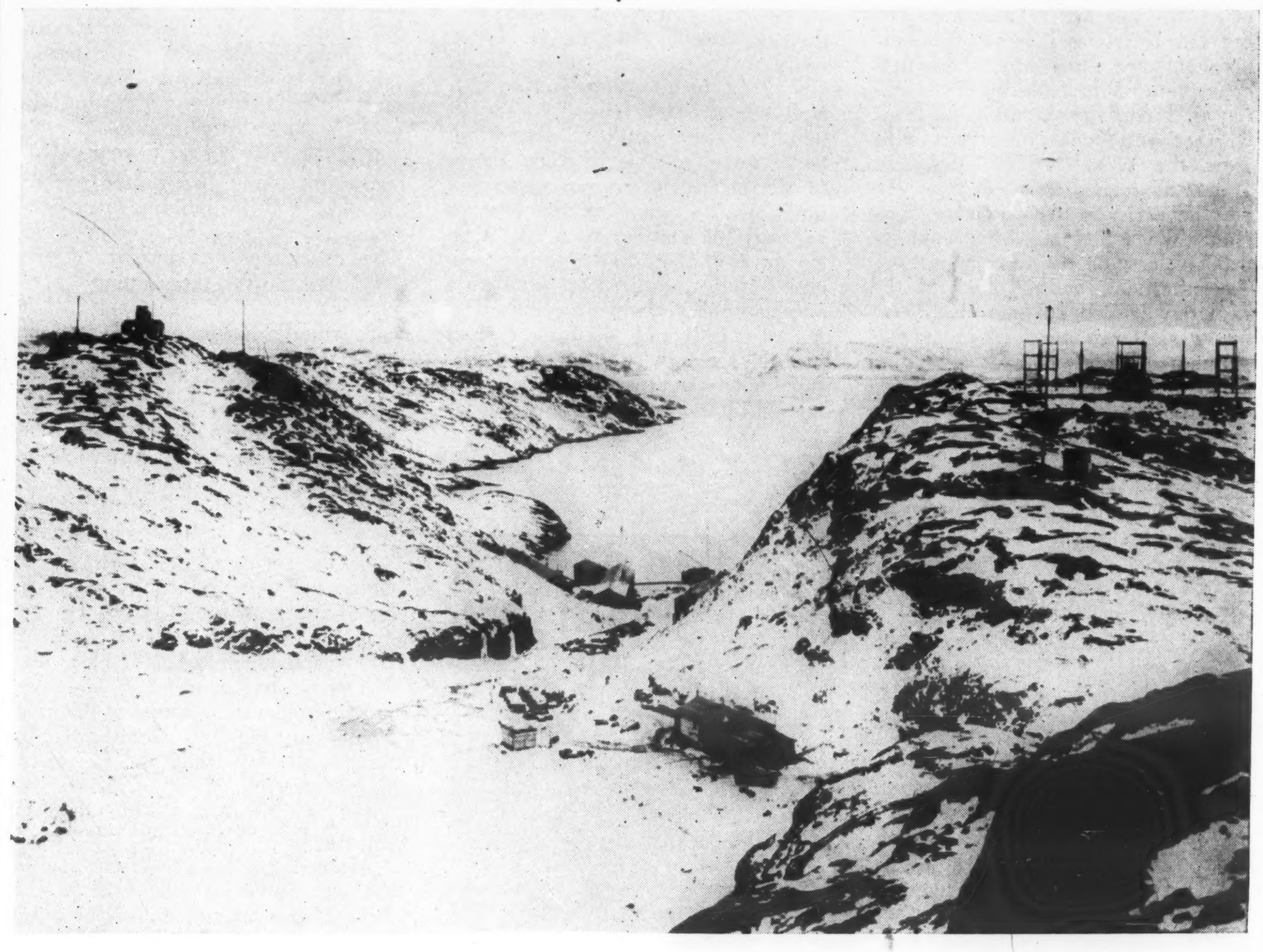
I shall repeat those three points—first, the organization had an appropriate place in a peace time military structure, second, it was capable of rapid expansion many times over without change in fundamental organization; and third, it was able to carry on and to discharge the commitments which fell to it both in the period of demobilization, and during the days that followed. Furthermore, it now bids fair to meet its future responsibilities, some of which I shall mention later on. It is important at this point to note that these commitments and responsibilities are different in kind from those Air Force activities which are purely in the nature of training. For the Air Transport Command, the Weather Service and the AACS did not change over to a training status after the war, nor have they done so yet. They have obligations of actual performance to the public, they are carrying passengers, they are carrying freight and mail, they are playing for keeps. This fact, that the organization was able to continue, even through rapid demobilization, is, I believe, the most important point of three that I have mentioned.

I said a moment ago that we recently celebrated our 9th birthday. I don't wish to relate the history of AACS at length, but a brief resume will help you to envision the way this particular communications system has grown and operated during these past 9 years.

Pre-AACS Flight

ALTHOUGH 1938 is the birth year of the AACS, actually we must go back to the time General Arnold led a flight of 10 B-10's to Alaska in 1934 if we are to understand how the conception of the AACS came about. I was with General Arnold on that flight as his Communications and Meteorological Officer and piloted one of the B-10's. We made a number of special arrangements for air-ground communications with existing radio stations, and although all concerned put forth their best efforts, we never really did line up anything

AACS Radio covers the far north in contrast to time of Gen. Arnold's B-10 flight only a decade ago.



even remotely resembling an adequate communications system.

The flight was organized in pretty much of a hurry. We flew up through Canada to Alaska and came back down the outside passage to Seattle. The only communications stations in existence in that area were a few Canadian stations at Winnipeg, Regina, Edmonton. and Prince Rupert, and the stations of the Washington-Alaska military cable and telegraph system, which were in Alaska principally for the purpose of serving all civilians in Alaska. None was for aeronautical use. We had a very weak reed to lean upon when we depended upon such an unintegrated communications system.

When we returned from Alaska, General Arnold remarked that the Air Corps must have its own communications to support such movements. His opinion in this regard was strengthened soon after we got back. General MacArthur, then Chief of Staff of the Army, assigned us a mission; viz, to move, as soon as we received orders, from March Field to Langley Field, to simulate loading up bombs, and to attack Fort Dix. You will recall that the B-10 bomber had made a marked impact upon the Air Corps, which had for many years been flying old Keystone LB-4's. The new bomber gave some people the first conception of the mobility of a striking air force, and the desire to learn whether you could move an outfit from the West Coast to the East Coast and immediately attack an enemy gave rise to this particular mission. We left March Field, about 5:00 o'clock Pacific time on a Sunday afternoon and at daylight the next day landed at Amarillo, Texas for gas. Our intended route was through Chanute Field, Ill. Bad weather had settled down over the Appalachians and we were advised to try to go around the front to the South. We cleared for Maxwell Field hoping to refuel there and go on up the coast before the front reached our destination.

We ran into the edge of the front down over Arkansas some place. The motors were sputtering pretty badly due to bad gas we got at Amarillo. Gen Arnold radioed to me, "Get hold of Barksdale Field and tell them we want to land, get rid of this gasoline, refuel, and we don't want to be on the ground more than 30 minutes." There was no radio station at Barksdale Field, La. However, we managed to raise the CAA Radio Range Station at Shreveport and had the message passed to "Miff" Harmon, who was then in command at Barksdale. Despite the fact that it was a holiday, Labor Day, Barksdale did a splendid job and we were on the field only 27 minutes. We were lucky too, as a cyclone struck near Barksdale a few minutes after our departure. By the time we got to Maxwell Field, Ala. it was very apparent that weather conditions would prevent us from going much farther north, so we spent the night in Atlanta.

We went on to Washington the next day and while there General Arnold stated a requirement for air-ground and point-to-point radio stations so located that an Air Force could move anywhere in the U. S. and always be in communication with at least one station in order to obtain important weather information, to advise of change of flight plans, to alert transient aircraft crews—in other words, to set up the type of organization that is now AACS. That was in 1934. In order to satisfy General Arnold's requirement for such a system, four years were required to hammer estimates through various budget agencies, obtain appropriations from Congress and procure the equipment needed to install some 35 A/G and point-to-point stations in the U. S. That was the beginning of AACS.

From 1938 until 1941 the continental operations of AACS continued without much change. But in April 1941 an AACS party went to Newfoundland to start work at Gander Lake. From this beginning grew the extensive wartime ferry routes to England over the North Atlantic, and later to Africa through the Azores. The year 1941 also saw plans for expansion overseas in the Caribbean, Alaska, Hawaii, and the Philippines. The wisdom of this action became apparent on December 7th.

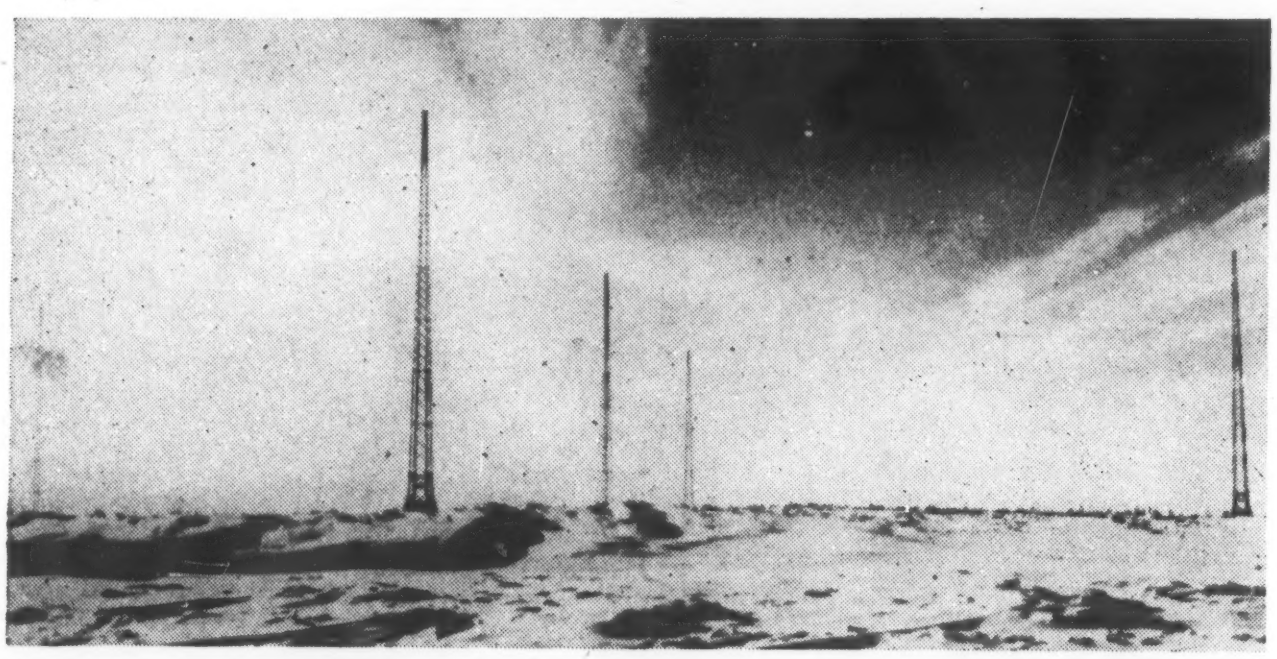
During all of 1942 the AACS was fully occupied in building up ferry routes to all overseas theaters and in developing its plans for further expansion. The 99-year leased bases in the Antilles were manned for the 1942 anti-submarine operations and also as way stations on a South Atlantic route to India through central Africa. In the Pacific the pre-war air route to Manila through Midway and Wake went by the boards through enemy action and was replaced in early 1942 by a South Pacific route through Fiji and New Caledonia to Australia. In Alaska and Western Canada we developed a ferry route to Siberia and an airway out along the Aleutians. This was a job—a very difficult job. One of the most difficult routes to create was over the North Atlantic.

The years 1943 and 1944 were spent improving the routes started in 1942 and in building new stations as offensive plans proceeded. The operations in support of the ATC flights over the "Hump" were perhaps the most spectacular, but concurrently a number of stations were established in China for the 14th Air Force and later for the early raids of the B-29's from Chinese bases. Three separate offensive prongs were supported in the Pacific initially, although the South Pacific effort merged with that of the South-West Pacific at a slightly later date.

By the spring of 1945 the two remaining Pacific offensives—General MacArthur's through New Guinea and the Philippines, and Admiral Nimitz's through the Marshalls and Marianas—had merged at Okinawa for the preparatory stages of the final assault on the Jap Homeland. In France, the Lowlands and Germany, the successful allied offensives secured new airdromes which had to be tied into the airways system.

Meanwhile, the great increase in the Air Force establishment in the Zone of the Interior called for more

Radio Range in Arctic Wastelands.



AACS Radio Stations and Operators.

AACS installations in the continental U. S., but naturally the overseas areas had first priority. Therefore, not until after the war could AACS implement what is now known as Plan 62,* The Military Flight Service Communications System—a network of strategically located stations which primarily furnish point-to-point and ground-air facilities, but also various aids to navigation such as control towers, radio ranges, direction finders, ground controlled approach units and instrument landing systems. This plan was drawn up to complement the communications of CAA.

In contrast to the three-region, 300-man organization which was the original organization of AACS in 1938, the wartime peak on VJ Day totalled more than 50,000 officers and men in the command. This expansion was accomplished without change in the fundamental systems concept of integration of facilities under which the AACS was originally organized. This was the largest communications company that the world has ever seen.

AACS Mission

HAVING BRIEFLY covered the history of AACS, I shall now turn to a formal statement of our mission and to the charter under which we operate. The basic document which authorizes the CS, USAF, to operate such a system is AR 95-200.

Under the authority of this regulation, the CS, USAF has assigned the following missions to AACS:

The Airways and Air Communications Service will operate (along such airways as military traffic justifies) airways communications, including electronic navigational aids, comprising the following types of stations: Fixed aeronautical point-to-point radio stations, ground-to-air radio stations, control towers, mobile control towers, radio ranges, marker beacons, direction finders, homing beacons, radar beacons, mobile ILS, GCA units, Loran, teletype, power units for all kinds of equipment, communications stations for transmitting and collecting weather information and for flight services—air traffic control centers, necessary cryptographic sections and message centers.

Even a cursory examination of our mission and services discloses immediately that AACS is a "common-user" service which the various elements of the USAF use to a varying degree. At one time during the war, there were 30 different agencies of the Army, Navy, Air Forces, and our Allies which made use of our facilities. It can readily be appreciated that only a systems organization, ready to serve all users impartially, could handle such a diversity of customers. As a good example, consider the situation in the Pacific in the summer of 1945 when the AACS was operating a joint Army-Navy airways system known as JACSPAC. JACSPAC is the short title for Joint Airways Communications System Pacific. It served no less than five units whose first and only echelon of common command was the Joint Chiefs of Staff. These units were ATC, 20th AF; the Fleet Air Units of the U. S. Navy, the Naval Air Transport Command; and the Far Eastern Air Force. They are the five principal customers, and the first place at which they meet a common commander is in the Joint Chiefs of Staff. Consider the confusion (not to mention the five-fold wasteful multiplication of men, material, and most important, radio frequencies) had each of these customers attempted to set up its own airways communications facilities on air bases which were commonly used, such as those in the Marianas, Okinawa, and the Philippines. Only an integrated organization operating under the Systems Concept could cope with such a problem within the bounds of reasonable economy. This was readily recognized by the customers concerned, as witnessed by their acceptance of AACS as the proper agency to serve them.

Command Problems

IT IS, of course, apparent that the AACS integrated communications system cuts across the long cherished military idea that the base commanders, or higher commanders, such as the theater commander, exercise direct command over all military elements within their geographical spheres. In fact, I suspect that a good many commanders have encountered the "so-called independence" of the AACS detachment at base level and possibly at higher levels. This is admittedly a controversial subject, much talked about and little understood. But, we can't have our cake and eat it too; we can't have the efficiency which a communications *system* gives us; we can't create the air routes needed so that our Air Force can move safely and expeditiously, and at the same time parcel out the pieces of that system to each and every local commander. Someone must run it as a system, and provide the management. In the case of the airways communications for the Air Force, that someone at present is the AACS.

However, like all controversial matters, there is much to be gained from a thorough airing of both sides of the question. I, therefore, propose to delineate some of the reasons why the Systems Concept is particularly applicable to airways communications and to show how we can get the most out of this system without

*SIGNALS—p. 36. Nov.-Dec.

abrogating the essential authority of the local commander. In short, I wish to show how we can have our cake and perhaps take a bite of it from time to time, as well.

In order to explain more clearly the Systems Concept as it finds expression in AACS, I wish to point out an analogy to be found in a big business organization. There are literally hundreds of local telephone companies in the U. S.—more than 900 actually—which serve communities of various sizes. But, there is only one American T & T system to handle long distance calls. You can imagine how much long distance service you would get if you depended for it on coordination between several hundred local companies. I doubt if you could ever get agreements as to which company would construct the wire lines between the companies, let alone solve the problems of operation. Fortunately, for the U. S. the American T & T takes care of all that by building inter-connecting lines and working out rate schedules, routing instructions, operating procedures and a number of other details which are necessary to enable any local telephone subscriber to call any other phone in the U. S. and even in some overseas locations. Moreover, it can cope with such jobs as setting up the wire circuits required for Plan 62. A collection of local phone companies could never do a job of that kind. In other words, the A. T & T is a working example of the Systems Concept as applied to the telephone business. Now, with this analogy in mind, let us examine our version of this concept.

The purpose of AACS, in brief, is to support the movement of AF aircraft between various bases or wherever the AF is to fly. That is its sole reason for existence. With the first call from the control tower, the flight becomes an inter-base proposition. It is like a long distance phone call. The pilot on the normal flight will use the tower during the take-off; he will check his progress with various aids, such as homing beacons, radio ranges, and direction finding stations; he will communicate for various reasons with air-ground stations enroute and he will be assisted in landing at his destination by one or all of the electronic aids, such as radio range, GCA, SCS-51, traffic control and the control tower. All this goes on while the point-to-point networks pass messages concerning the flight by teletype or radio telegraph and collects weather information for forecasting purposes. All these services, together, are designed for the safe and expeditious movement of the flight. No one of the components just mentioned can be pulled out without weakening the system.

Alcan-Airway Installations

AS AN example of how the Systems Concept actually works in practice let me tell you about one of our most recent rush projects—the reopening of the Alaska-Canada airways route.

A directive for the reopening of the Alcan Airway along the Northwest Staging route was made by AF Hq. 22nd of August of last year. All facilities were to be ready by 15 October. AACS was directed to install and operate a VHF/DF at Great Falls, Montana: a VHF/DF, a GCA and a Racon at Edmonton, Canada; Fort Nelson, British Columbia and the same facilities at Whitehorse in the Yukon. In addition AACS was directed to install and operate a GCA and control tower at Big Delta in Alaska, and to make sure that certain of its existing facilities at Elmendorf Field and Ladd Field remained on an operational status. And, over and above its own commitments, AACS was asked to give a hand to the Canadians by supplying and installing VHF Air Ground equipment for use by the Department of Transport at Lethbridge, Grande Prairie and Calgary. All of this had to be done without additional personnel authorizations and without closing down any ZI facilities.

Now you can imagine what would have happened to such an urgent project had there not been in existence a communications company, if I may call it that, experienced and trained to handle the problems involved. Just picture the confusion had numerous base commanders been called upon to supply men and materiel and to coordinate all activities toward a common goal. Who would feed the personnel, pay the troops, provide special services, furnish supplies and tie-in the proposed stations with the other communications outfits with which they would have to do business—the RCAF, the Canadian DOT (like CAA) and the Alaskan Air Command? These questions would undoubtedly have taken longer to resolve than the time the AACS took to complete the job. And the sum total of the answers would have been to put some competent organization in charge of the whole project, just as AACS was chosen to do in the first place.

The theory and practice of the Systems Concept as exemplified in the Alcan Airways instance will give you some idea of the benefits derived from the Systems treatment as applied by AACS. There are many other advantages inherent in the concept, but the foregoing provides you with a broad-canvas picture of the concept as applied to AF Communications.

Command Conviction Avoidable

I HAVE ADVANCED, thus far, the reasons in justification of the so-called "independence" of the AACS detachments. Let us consider now the attitude of the base commander. The base commander's interest in AACS facilities is almost always centered on such items as the control tower, radio range, GCA, and SCS-51, which he associates with his base more closely, for example, than the air-ground communications along the routes, and he is inclined to take a dim view of the fact that the AACS personnel are not assigned to his command, and to translate this lack of command into a feeling that he does not have the right to make the AACS people produce the results he desires. This feeling is entirely unjustified, as the base commander has full operational control over his local detachment.

The AACS commander of a local detachment has a dual responsibility. First, he is required to operate his station to fulfill the local needs as set forth by the base commander or his authorized representative, usually the operations officer. Second, he must integrate his station into the system in accordance with technical and operational instructions received from higher headquarters. It is in discharging his first function that he comes under the base commander's operational control, which we define as the right to demand service.

If both the base commander and the AACS detachment commander understand their respective functions, there should be no conflict between the two responsibilities of an AACS officer—that to the base and that to his own organization. In case a conflict does arise, the base commander's wishes must be complied with until the question can be reviewed by higher authority.

In general, a base commander can accomplish his most effective supervision of the local AACS activity by the following methods:

First, consider the senior AACS officer on his base as a member of his staff.

Second, include AACS facilities, particularly transmitter sites and

range stations, in his tours of inspection, in order to find out what he has on his base and how it should perform.

Third, learn the AACS chain of command above the local detachments so that he can know whom to go to if he doesn't get satisfaction from the detachment commander.

Fourth, pay more attention to the AACS inspection reports which pass through him.

Fifth, and most important, know what the AACS is supposed to furnish him—that is, know its capabilities and its limitations and demand the service that the AACS should supply.

I have tried to point out how the existence of the AACS as a system makes for safety of flight and how operational control by the base commander can be employed to secure the service he needs.

There is also the matter of the proper attitude on the part of the subordinate commander who is served by the system. He should support the local managers of this system and at the same time critically examine the standards of service being given his organization by the system. He should not start a one-man campaign to take over that portion of the system which happens to lie in his bailiwick. This suggested change in thinking will naturally come hard to those trained in the omnipotence of command, particularly some of the most positive characters whom the military system seems to produce . . . but, it is necessary if we are to cash in on the inherent efficiency of the system.

Future of AACS

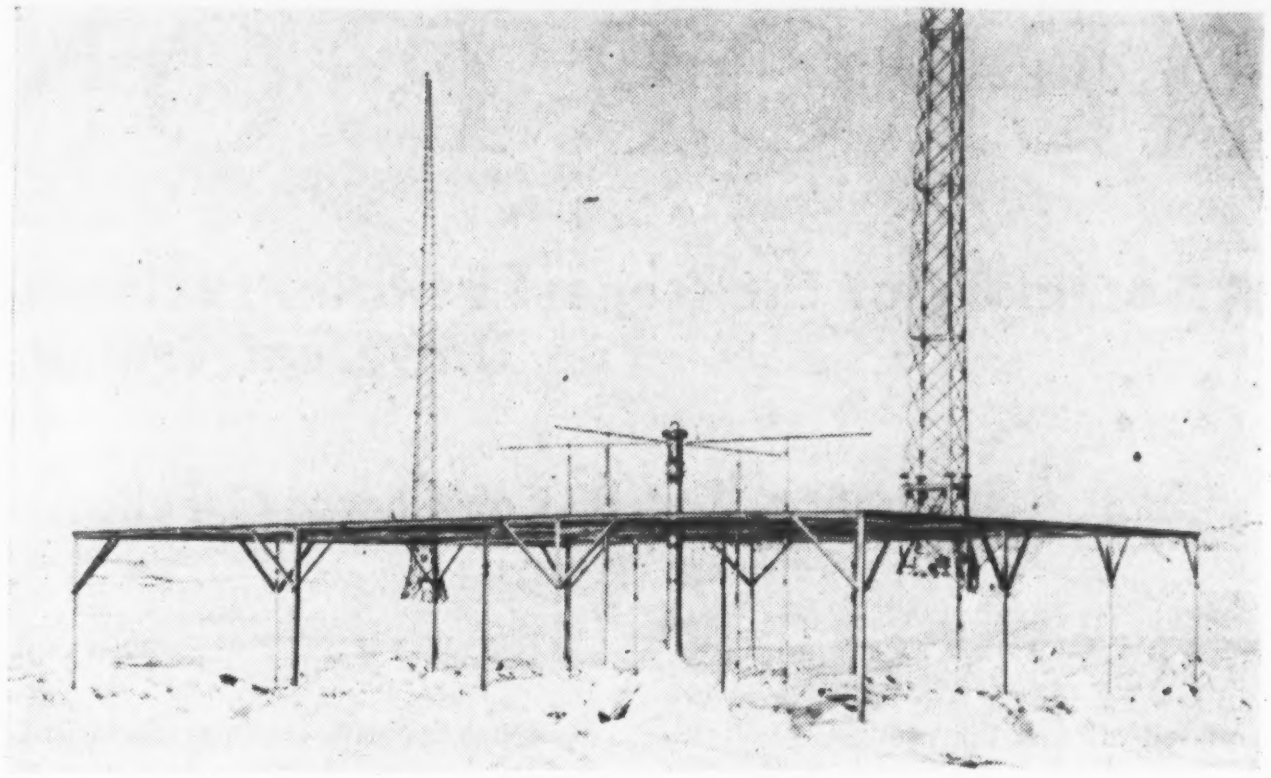
I SHOULD LIKE to turn to the role of AACS in the future. We think we are barely on the threshold of electronic applications to problems involving aids-to-navigation and flight control. Out of recent scientific advances, there have arisen difficult questions concerning some of the automatic systems that have grown out of radar. These new methods demand a Systems Concept treatment to an even greater extent than we employ today. This points to a strengthening of the present Air Force policy to preserve the AACS as an integrated system.

There is another development in the AF which may affect the AACS. It arises from the possible trend toward merger of Army, Navy and Air Force communications which may be called for under the present unification of the armed forces. The whole problem rests on the question of economy. How can we obtain command communications for each service without triplication of effort? Fortunately, the technical advances in multi-channel radio teletype equipment furnish part of this solution, since one transmitter, receivers and one frequency can be used to produce several individual radio teletype channels, each of which can be used simultaneously by different customers. The trend now is for the Joint Communications Board to act as the managing or governing body to allocate responsibilities to one of the three services for setting up command circuits which can be used by each of the three services. From an AF standpoint, if it is to implement its share, this will require a communications system. Since the AACS is the only AF system in existence in the communications field, it may develop that the most economical method will be to increase the scope of the AACS to include command circuits, at least for the operation of the outside plant. The outside plant would maintain a collection of transmitters, and "lease" a circuit to customers who would operate the teletype or the key at the terminals. That's what you do with A T & T—you "lease" the facilities they maintain.

Because of all the reasons I have listed for the retention of a communications *system* in the AF, I believe that the heretofore accepted statement that communications is a function of command is subject to qualification. To a certain extent it is true. However, under the System Concept it has to be taken with some modification. According to my concept of communications, it is a function of command *only* at the level where the particular communications system is controlled. Below that level the commander is concerned only with communications as a service to him. I repeat this important point for emphasis—*Communications is a function of command only at the level where the particular communications system is controlled.*

One unfortunate result of our present set-up is that commanders of lower units are given certain communications resources in terms of men and material by Tables of Organization. As a rule they cannot furnish the third necessary ingredient—management. Then some higher headquarters takes hold of the problem and sets up a system—that is what we had all during the war. We ignored Tables of Organization and organized a system that was controlled at the top level. The men and material for this system were wasted for this system when they were allocated to lower units. How much more efficient it would be if the higher commander had the men and material in one communications organization reporting directly to his headquarters . . . in short, had concentrated the three indispensable ingredients—men, equipment and management — at one place in the command chain.

One of the great lessons we learned in the last war was the value of communications *systems*. The AACS organization has been presented here as a working example of what can be done with what we have learned. But, the Systems Concept, is not necessarily peculiar to AACS. It has potential application to other parts of the Armed Forces.



Z Marker and Radio Range Site in Arctic.

REPORT ON UMT

A Summary of the Report of the President's Advisory Commission on Universal Training

By Col. Conrad G. Follansbee

(Editor's Note: In our Editorial in SIGNALS in the July-August issue we deplored the fact that Congress had adjourned without acting upon the important issue of Universal Military Training. In that editorial we stated, "It seems that nearly everyone who has an unselfish and intelligent interest in our welfare is in favor of UMT. The President's special commission, chosen with such intelligent care to include representatives of the principal religious faiths, of the best educational leaders, the foremost scientists, colored and white Americans, the legal profession, leading industrialists, a labor relations expert, were unanimous in pleading for it. The people see the need for it, at last. Former Justice Roberts of the Supreme Court is so insistent for it that he wants to have Congress recalled into special session if they do not pass it. What, then, are we waiting for? We should make our house secure from the outside before we proceed with improving the inside!"

Since then there have been debates over national radio hook-ups, articles in every conceivable sort of magazine and paper and the National Security Council has been formed. This council, which has for its slogan "peace through preparedness," is taking the leadership among civilians in a campaign to provide Universal Military Training for America during these critical days. Headed by the distinguished former associate justice of the Supreme Court, Owen J. Roberts, representatives of leading activities include Dr. Isaiah Bowman, president of Johns Hopkins University, Mrs. LaFell Dickinson, former president of the General Federation of Women's Clubs, Joseph C. Grew, the former ambassador to Japan and former Under-Secretary of State, Robert Cutler, president of Boston's Old Colony Trust Company, Dr. Charles Armstrong, president, Kiwanis International, Paul Betters, executive director, United States Conference of Mayors, Ray H. Brannaman, commander in chief, Veterans of Foreign Wars. Justice Roberts says that more than fifty national organizations with a combined memberhip of more than 16,000,000 are co-operating in the committee's Security work. Many of our national leaders have pronounced the "Report of the President's Advisory Commission on Universal Training" to be perhaps the most forward looking document on National Security ever published in the United States. If every American citizen could read this report they would have a better understanding of what this type of training means. Since they cannot, SIGNALS is publishing a summary of the report which appeared recently in the "Military Review." This report sets forth in such complete detail the entire subject that it provides more than a suitable answer to the recent discussion by Dr. Hutchins of the University of Chicago in opposition to this training, especially so since a study of the committee's report indicates beyond any question of doubt that the greatest care was taken to study the question from all angles before decisions were reached.)

The Report

ON 20 November 1946, President Truman requested nine prominent citizens to serve on an advisory committee on Universal Military Training. The committee, headed by Doctor Karl T. Compton, after extensive research study and deliberation, and after hearing some 200 witnesses, representing all segments of the public, rendered its report on 29 May 1947. The title of the report is "A Program for National Security," and the cover page indicates that it is the "Report of the President's Advisory Commission on Universal Training." It will be noted that the Commission very properly widened the scope of its inquiries to include broad problems of national security, and it will be noted also that the Commission did not confine its report to military training alone, but included other types of training for young men, who for some reason or another, would not be available for military training. However, their recommendations with respect to non-military training were general in nature and subject to further study.

The document, for sale at the Government Printing Office in Washington is perhaps the most important summary of the military requirements of the United States which has been published in our generation, because of the caliber of the Commission's membership and the civilian viewpoints expressed. Its compelling logic should be made available to all citizens, to assist them in arriving at sound conclusions concerning vital issues which now face our people and our Congress. Certainly every officer of the armed forces should be acquainted with the contents of this report.

This article attempts to summarize this important document for those whose limited time deters a reading of the full report, but no summary of this length can hope to present the subject so well as the report itself.

The Commission strikes a keynote in one of the early paragraphs of the report; "The only basis on which Universal Training should be accepted, in our opinion, is a demonstration that it is needed to insure our safety in a world in which peace is not yet secure. We are convinced that such training is an essential element in an integrated program of national security designed to protect the United States against possible aggression, to perpetuate the freedoms for which millions shed their blood, and to hasten the advent of universal disarmament and peace, through the United Nations. . . . we are convinced that without Universal Training the Nation's defense would be incomplete and inadequate."

Unless otherwise stated, the paragraphs which follow are summaries of various portions of the report of the commission.

The World Situation

THE only real security lies in the abolition of war through the establishment of the reign of law among nations. The United Nations em-

Courtesy: *Military Review.*

bodies our hopes for a durable peace. The United States has committed itself to a position of leadership in building the United Nations into an effective instrument for banishing war. But at the very time we have assumed this commitment, we have allowed our military strength to fall away from us.

For a few years our monopoly of the atomic bomb and the availability of millions of war veterans may serve as insurance against direct attack, but the rapid drop in the state of our military readiness will encourage would-be aggressors, and weaken the faith of our democratic friends in our will and ability to make real the principles for which we stand. The blandishments or threats of competing ideologies will tend to spread totalitarianism, increasing our peril and decreasing the number of our peace-seeking friends.

Ample evidence is available to prove that Hitler counted upon the weakness of the democracies in planning his wars of conquest. It is apparent from the lessons of history and from the experience of the post-war period that the only way in which we can lend authority to our voice in international affairs and inspire confidence in the ability of the United Nations to enforce peace, is to maintain our Armed Forces at a level of efficiency and comprehensiveness that will defy challenge by would-be aggressors. A weak nation can only beg, not command respect and reciprocity.

Nature of Possible Future Warfare

A nation bent on conquest can prepare in advance and select its own time, place, and mode of attack. Under its constitution the United States cannot, and thus must prepare against every type of attack, from any source. Because of its wealth and its potential ability to thwart any attempt at world domination, the United States is a prime target for future aggression.

Long range aircraft now make it possible to deliver an attack across the ocean or the polar cap with increasing intensity and suddenness. Weapons of mass destruction have been added to the devastating strategic warfare of World War II, and "Pearl Harbor" attacks are vastly more probable. We will never again have months to mobilize, train, and equip an effective fighting force. The speed and force of future attack make imperative the maintenance, in a constant state of readiness, of a counter-attacking force which can retaliate instantly with the most modern and powerful weapons. Under these conditions every city, every factory and every farm would become part of the combat zone. Fifth column activities would precede attack upon us paving the way for disunity and surrender.

The report of the Commission sets forth its views on the ways in which the United States might become involved in war, and the probable nature of such wars:

a. Direct attack by a powerful enemy or combination of enemies at such time as the potential aggressors can produce atom weapons or other mass destruction weapons in quantity. Such an attack would be preceded by softening-up activities by subversive agents and their domestic allies and dupes, using espionage, sabotage and propaganda. Initial objectives of such attacks would be to immobilize us militarily, industrially and politically, and to create panic and demoralization among the civilian population. Efforts would be made to cripple or destroy our facilities for striking back.

b. Involvement in war through the aggressive tactics of some nation against its neighbors in a distant part of the world, which we and the United Nations could not countenance because of the potential threat to world security, or because our international conscience would not permit us to stand passive while the rights and liberties of others were transgressed. The aggressor would start with political infiltration, followed by military and political domination, in the hope of increasing his overall resources and improving his geographical position before becoming involved in war with the United States.

c. Effort of a powerful European or Asiatic nation to gain a foothold in Latin America. Political penetration would seek to extend the circle of our enemies, with more overt forms of aggression a logical result. We must defend against this possibility by the vigor of our own example and by the extension of economic aid to world democracies.

d. Policing action against a small nation menacing the peace and security of other nations, independently or in conjunction with other United Nations. Such a minor action might be the spark to ignite a world conflagration. which would find members of the United Nations arrayed against one another.

The Commission concludes that the era of push-button warfare is not yet arrived, although it concedes that another twenty-five years may witness the development of weapons which can wipe out millions of people overnight. The Commission apparently agrees with the view that any war in the foreseeable future will commence with sudden and devastating air raids on centers of population and important industrial and military objectives, followed by landing of airborne invaders. Under such circumstances the Commission sees two principal military needs:

a. An airborne striking force in being, composed of highly trained professional troops in a constant state of alertness, to intercept enemy attack, prevent follow-up attacks, to retaliate against the enemy, to dislodge him from bases he is using, prevent his acquiring other bases, and to gain for ourselves bases close to the enemy homeland.

b. Trained men in every part of the country ready and able to meet disorder, sabotage and invasion.

Future Needs

THE Commission devotes considerable space to a discussion of the continuing need for trained manpower in future warfare. It points out the need for professional land, sea and air forces for interception and counterattack, and considers the tremendous tasks of "civilian" defense in areas which have sustained devastating attacks as complex and urgent, and needing a ready force of well trained and disciplined manpower. The Commission concludes that local defense forces must be military in character, and must be provided by civilian components of the Armed Forces. The Commission foresees the need for land armies, and naval forces, as well as air forces, in the struggle for vital bases which will follow the initial blows.

The outcome (of any future war) may not be determined by superiority in weapons of mass destruction. We may have to employ traditional strategy, as for example, if any enemy were to seize friendly territory as bases. We could not subject our friends to atom bombing. Atom bombs may not end a future war as they did the war with Japan. (The Commission infers that the war with Japan had been won before the atom bombs were used and that they were but the "last straw.") We cannot rely exclusively on atomic warfare. We have no evidence of our ability to conduct long range mass atomic war under conditions lacking the element of surprise. The United States cannot face the future without large reserves of men trained and disciplined in the use of the weapons and techniques of war, to ward off the first blow and retaliate, to secure bases and to man

the ships and planes needed for counteroffensive action, to invade, to repel invasion, and to occupy conquere pel invasion, and to occupy conquered territory.

To shut our eyes to the continued necessity of these functions and rely on the vague prospect of guided missiles would be criminal negligence. *The United States cannot continue to be the only major power without any system of military training for its citizens.*

Essentials

THE report of the Commission then proceeds to set forth its views as to the essentials of an integrated national security program. In introducing this topic, the report comments "In attaining national and world security we must build upon the unity of our people and the vigor and vitality of our democracy. We must battle economic instability, racial discrimination and group conflict, as food for hostile propaganda machines."

The first need seen by the Commission is that of a strong, healthy and educated population. The Commission points out that this is *not* a part of the military training job, although it views military training as contributing indirectly to this objective.

The report refers to the necessity of a coordinated intelligence service, a vigorous and continuous program of scientific research and development, and the stimulation of the training of scientists and engineers, as security essentials.

In discussing industrial mobilization the report advocates industrial readiness for war, the provision of the latest weapons to the Armed Forces at all times, despite the expense of constantly scrapping obsolescent matériel. Dispersal of essential war industry is recognized as a need, with a suggestion for federal financing of the peace-time construction of underground industrial facilities. Dispersion of government agencies is advocated, and the need of a large and healthy merchant marine is pointed out.

The report refers next to the need of regular armed forces to comprise a striking air force and forces required for general counteroffense action. While not specifically referring to the National Guard and Organized Reserve in this section, other sections of the report dwell upon the necessity of strong effective reserve components. the maintenance of which would be one of the most important objectives of the Universal Military Training plan. The impracticability of recruiting and maintaining a professional force in itself large enough to meet all the demands of war, is noted.

Finally the Commission lists Universal Training as an essential of security. "To meet universal attack we must have trained men everywhere. We do not believe there is any other way of guaranteeing that the Armed Forces will be able to count on a sufficiently speedy flow of trained men to win a war, if large scale fighting for bases or invasion of the enemy homeland are needed. But even more immediately and even more certainly, these pre-trained young men will be ready to cope with the unprecedented problems of internal security which atomic war will bring."

The danger of considering Universal Military Training as a panacea is stressed. There is a danger that Universal Training will lull the country into a false sense of security to the neglect of the other essentials of security. The training plan is only one part of the entire program proposed by the Commission, all of the parts of the program being considered equally important. The report quotes Mr. Bernard M. Baruch as saying, "Universal Training must be considered as the apex of a pyramid grounded on the broad bases of industrial preparedness, military intelligence and other essential elements. Only if combined with a sound and comprehensive plan for National Security can it (Universal Training) be effective."

Before describing the plan which they recommend, the Commission outlines the role of Universal Training. Pointing out that war in the predictable future will require *more* and not *less* trained men, and that in World War II our Allies gave us the time to mobilize and train our forces, the statement is made that Universal Training will enable us to stockpile the time needed to train additional manpower, will provide an indispensable base of training to build up the civilian components, and will shorten mobilization and war training.

Military training will initiate our young men into the ways of the Armed Forces and enable them to make psychological adjustments more readily. It will familiarize them with weapons, teach them to think like soldiers in emergencies, accustom them in group action, and will assist in the selection of leaders.

The civilian components cannot be maintained at strength by voluntary methods. The pre-war National Guard of 200,000 had only sixty-five per cent of its assigned personnel effective upon mobilization. It had depended upon recruits without prior military training and was constantly retarded in its training by a high turn-over rate and by the necessity of imparting basic instruction to the new men. It was consequently incapable of swift welding into cohesive and disciplined units, and took many months of preparation after it was called into Federal service to prepare for war service. The Organized Reserve is obviously subject to the same handicaps to an even greater degree.

Universal Training, calling for six months of basic training in camps or on shipboard followed by service with the reserve components of the Armed Forces, would give the National Guard and Organized Reserve a steady flow of pre-trained men and a state of readiness, otherwise unattainable. It would, moreover, improve the alertness, efficiency, and quality of the regular forces, by giving them a challenging job and something to work with, and by making them responsible to a public more than ever interested in the activities of the Armed Forces.

It would produce leaders (reserve officers) and would provide a continuously replenished pool of young, physically fit and trained reserves located in every community of the nation, for defense and disaster action, and to provide the needed manpower for a war-time Army and Navy.

The Selective Service System which would have to be operated in connection with Universal Training would enable us to maintain a continuous inventory of military skills, aptitudes, and leadership qualities, which would permit prompt and effective war-time assignment of personnel.

By bringing together young men from all parts of the country and from all walks of life to share a common experience and to fulfill a common obligation, Universal Training should contribute to national unity.

Cost of Universal Training

IN discussing the budgetary aspects of Universal Training the Commission points out that even if we could get enough volunteers for the regular forces, the cost of the professional force which would be needed without Universal Training would be ruinous, not to mention the constant large drain upon the productive labor force of the nation. The cost of Universal Training for a year ($1,750,000,000) would be less than the cost of one week of World War II.

and would be less than ten per cent of the amount that the American public now spends annually on tobacco, cosmetics, liquor, amusements, and jewelry. With Universal Training, economies might be possible in the regular forces' budgets as a result of the smaller forces which would be required and the saving in training time.

The Commission dismisses the more common arguments against Universal Training (undemocratic, war-like, militaristic, a misuse of funds needed for education, high taxes, etc.) tersely and effectively, and then proceeds to set forth what it conceives to be the objectives of Universal Training.

Objectives of U. T.

POINTING out that military training is not a substitute for the influence of the home, the church, and the schools, in matters of health, education, citizenship, and morals, the Commission says that military necessity is the prime consideration in connection with the plan. The plan must be universally applied, and none exempted, except those who can make no useful contribution to the national security. There must be equality of privilege and opportunity, and the program must be a responsibility of the people as a whole.

General Structure

The general structure of the Universal Training program is seen by the Commission to rest upon the obligation of every male American upon reaching age eighteen, to undergo a period of training to fit him for service to the nation in a future crisis, this training to be predominantly military, those unfit for military training receiving some other useful training, concerning which the Commission indicates that further study is necessary.

The training envisaged is to be divided into two periods, the first a period of six months full time training in camp or on shipboard, and the second a period of part time training under one of several optional plans involving varying periods of time. The first phase would be devoted primarily to basic individual training while the second phase would continue individual training into more advanced stages, would permit unit training (in the reserve components of the Armed Forces) and provide officer training for qualified trainees (in colleges).

Control and Supervision

The Army, the Navy, the Air Force. and the Coast Guard would operate the military training program for those persons allocated to them. In each community near a Universal Training Camp, a volunteer civilian advisory commission is recommended, to work with the local commander in matters affecting the health, morale, welfare, and morals of the trainees.

Registration and Selection

UNIVERSAL Training would require establishment of a Selective Training System patterned after the Selective Service System of World War II. A civilian appointed by the President would head the National Selective Training Office and local boards would be established in every community in the same manner as those of the Selective Service System. The selective organization would function under general policies established by the Universal Training Commission. The local boards would register all male citizens as they became seventeen years of age; determine whether they were fit for military training, and if not, for what other type of training; pass on requests for temporary deferment and prescribe the time at which individuals would commence their training. In addition, it is considered that the local boards would accomplish a large part of the physical classification and aptitude and intelligence testing normally associated with induction processing. Upon completion of basic training, the local boards would also be responsible for supervision and enforcement of performance of the optional phase of training. Finally, these boards would maintain a registry of men who had received training in the preceding six years.

All male Americans would be required to register at age seventeen, and would be liable for training upon becoming eighteen, or upon finishing secondary school if later, but in any event would be required to commence training before attaining their twentieth birthdays. Those who have finished school between seventeen and eighteen years of age could, with their parent's consent, enter upon training before their eighteenth birthdays.

It is estimated by the Commission that 1,100,000 young men become eighteen each year, of whom 50,000 would be unfit for any training.

Status of Trainees

DURING the six months period of basic training the trainees would be under military control, but would not be members of the Armed Forces, nor be subject to the Articles of war. A special code of conduct would be adopted by the Congress to govern the trainees. All training would take place in the United States (or in its territories or possessions in the case of those resident therein), or on ships of the fleet designated as training ships. Trainees would receive a monthly monetary allowance of $25.00. There would be no post-training benefits. Dependency allowances would be payable to bona fide dependents of trainees.

Basic Training Periods

THE Commission recommends that there be two consecutive basic training periods each year, one to start on 1 May and end on 31 October, and the second to start on 1 November and end on 30 April.

The Commission felt that the type of training should be left to the operating service. However, they did emphasize their strong convictions concerning certain aspects of the training. Thus, for example, they felt that commando type training should be eliminated, that great emphasis should be given to the information program, that considerable duty time should be devoted to general education and instruction in citizenship. The Commission is apparently apprehensive that there will be too much leisure time, for they insist that the program be intensive and proceed on the hypothesis that most of the trainee's time must be considered duty time — that there must be no forty hour week—that the trainee's time should be fully occupied, and that many activities, normally considered by the Armed Forces to be off-duty activities, be incorporated in training schedules and thus made compulsory.

Discipline

AS to the discipline of trainees during the basic training period, the Commission recommends that the code of conduct be based upon a recognition of the youth of the trainees, and the fact that the camp experience represents, in many cases, their first time away from home. Leadership and guidance is to be stressed rather than punishment. Where punishment is necessary to support proper discipline, minor misdemeanors are to be tried by military courts, and more serious cases by Federal, State, or Military Courts as the accused trainee may choose. Trainee courts which have worked so well in the Experimental Unit at Fort Knox are recommended for minor derelictions. In connection with dis-

cipline of trainees it is recommended that Federal legislation be enacted to make it a Federal offense to sell liquor or narcotics to trainees. Prostitution or procuring in connection with trainees, and assault of a trainee with a deadly weapon are also recommended Federal offenses.

Welfare

THE Commission would charge the Armed Forces with the following responsibilities:

a. Correction of physical defects and improvement of health of trainees.

b. Exercise of care in assisting trainees to make emotional adjustment.

c. Reduction of illiteracy.

d. Furnishing of vocational guidance through testing.

e. Numerous specifically defined measures to protect the morals of the trainees, with great stress upon more chaplains and greater responsibilities for chaplains.

Options

Upon the completion of the basic training period of six months, the trainee would be required to adopt one of the several optional methods of completing his obligation under Universal Training.

Pointing out that the trainee will then be well grounded in the fundamentals of a soldier's job and will continue to be so qualified, in diminishing degree, for a period of five years without further training, the Commission says that he would be qualified, as a result of this training, for home defense duties for an additional ten years. However, he would not be fully prepared for effective participation in a trained unit in war time, without a further period of individual and unit training following the basic period.

The options which are recommended by the Commission provide for the following:

a. Opportunity for specialist and officer training.

b. Unit training.

c. Maintaining the National Guard and Organized Reserve at full strength, with pre-trained men.

d. Creation of an adequate officer reserve.

The options suggested by the Commission are:

a. Completely voluntary decision to continue camp or shipboard training for an additional six months in order to receive specialist, unit, and leadership training.

b. Enlist in one of the regular Armed Forces, before, during, or after completing basic training. This option too, is completely voluntary on the part of the trainee.

c. Entrance into the U. S. Military Academy, U. S. Naval Academy, U. S. Coast Guard Academy, U. S. Maritime Academy, or any accredited State Maritime Academy.

Enlist in the National Guard for a specified period of enlistment.

Enlist in a unit of the Organized Reserve Corps for a specified period of enlistment.

Enlist in the Enlisted Reserve Corps and pursue a college ROTC course, with the agreement to accept a reserve commission if offered.

Enlist in the Enlisted Reserve Corps and enroll in a civilian trade school, vocational school, or college which offers training in the professions, arts, and skills having wartime military value.

For those who could not adopt one of the foregoing options (as for example, in the case of a man not going to college, whose home town has neither National Guard nor Reserve Units) there is a "catch-all" option requiring enlistment in the Enlisted Reserve Corps for six years, with provision for a maximum of one month's active duty training each year during that period.

In connection with the options involving education, the Commission recommends that scholarship or grants-in-aid be given to a number of selected trainees each year, predicated upon an agreement by the trainee so selected to serve a specified minimum period (two years suggested) on active duty with the Armed Forces, following his graduation from school or college.

The deep concern with which the Commission apparently views the importance of the security program outlined in their report is expressed in one of its paragraphs:

"If the people of this country will declare in convincing fashion their determination to support such a program in all its elements for as long as may be necessary to guarantee the attainment of a stable world order through the United Nations, they will make the greatest contribution to perpetual peace within their power."

To which the thinking army officer can only add "Amen."

"Purely military universal service has never been much to my liking. But at the present time I think it is probably one of the most important gestures we can make to convince the USSR that we mean to remain strong in a military way until some settlement is made within the United Nations which will make it possible for the UN to be strong enough to hold even a big nation in check. Then I would agree that disarmament was justified and much to be desired.

"For years people have searched for a way in which to give the same sense of responsibility and selfless devotion to their country which is called out in time of war. This year of service might well be the substitute that has been looked for. We need to start our lives as citizens with a sense of responsibility to the community. . . ." *Mrs. Eleanor Roosevelt.*

". . . It is my firm conviction that our failure to have such a program in the past has forced two destructive and costly wars on us in our generation. It was our apparent weakness and not our strength that caused Germany and Japan to assault us. No sane ruler or country would deliberately provoke war with a rich country like ourself if it were known that we were ready to defend ourselves. Any bully might try it, otherwise.

"Under the present world conditions, the same danger exists, and I do not believe there is any way that America can be ready for every emergency other than to tarin our youth.

"It is my belief that legislation establishing a system of universal military training should be accomplished at the earliest possible date. I feel certain that the American people will give their overwhelming approval to it when the details of the program are laid before them. . . .

"It is far better that all of our male population give a short period of their lives to the prevention of war than for some of them to give their full life in a total war. Wars in the immediate future will come to this nation only if we are militarily weak. A vigorous country, economically, socially, and militarily strong — striving for universal leace — must become our nation's objective. A program of universal military training is fundamental to the accomplishment of this goal." *Governor Earl S. Warren of California.*

". . . Everyone who measures up to the full stature of his citizenship should be trained to discharge in full, not in part, his obligations of citizenship as well in times of war as in times of peace. Military training as an incident to the education of American youth should be encouraged, continued, and extended as an incident to the academic, scholastic and physical preparation of a 100 percent American citizenship for today and tomorrow in order 'to insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty' to themselves and their posterity." *Representative Charles A. Plumley of Vermont.*

SC Interference Reduction Program

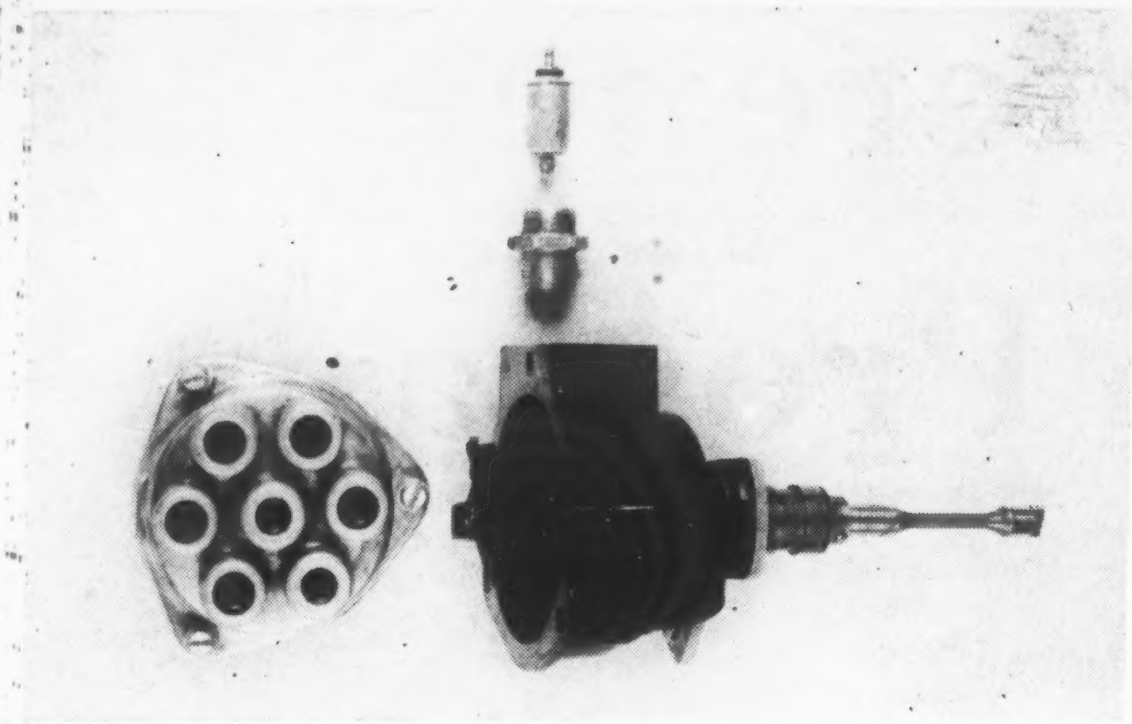
By J. F. Chappell

Signal Corps Engineering Laboratories

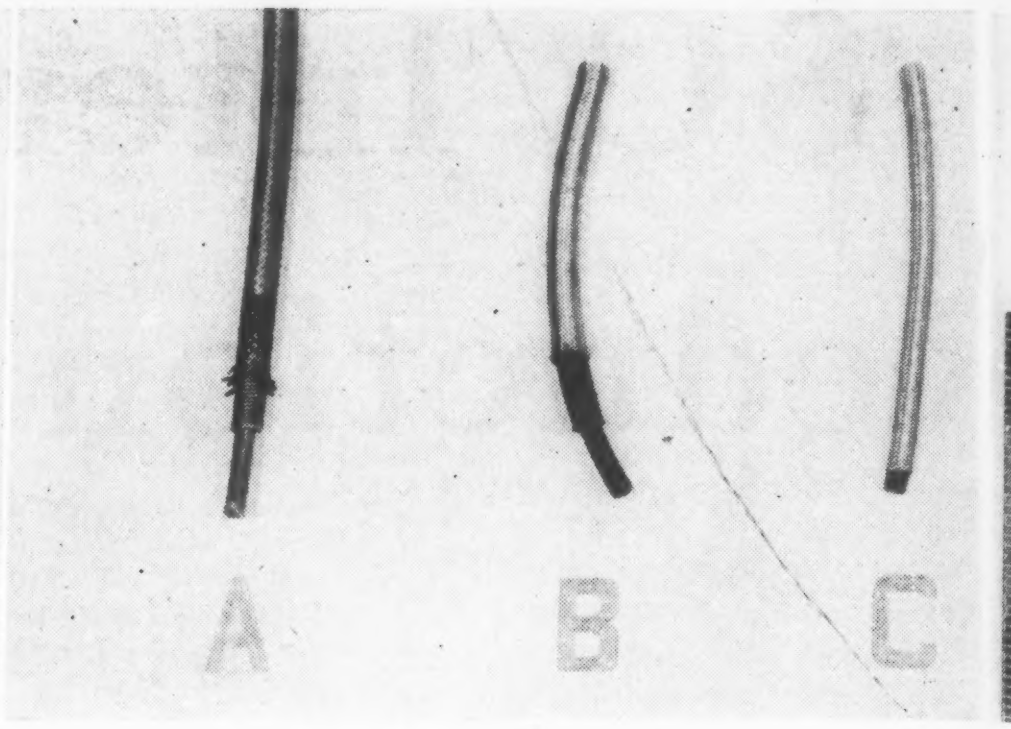
RADIO sets have always been subject to interference from man-made and atmospheric static. While there is little that can be done about natural disturbances, man-made radio interference, an undesired characteristic of many electrical and electronic equipments used by the Armed Forces, can be eliminated or minimized by the application of sound engineering and design principles.

Radio-interference is generated by sudden changes in electric or magnetic potentials such as are brought about by electric switching, vibrating electrical contacts, commutators, electric arcing and sparking, pulsed currents as generated by radar modulator units, discharge of electrostatic charges built up on insulated surfaces, and corona. The interference generated by such electrical actions is broadband in character and in general this spurious energy may influence radio-receiving circuits tuned anywhere in the radio frequency spectrum, from the very low frequencies well into the micro-wave spectrum, of 4000 mc and beyond. This interference effect can be transmitted from the generating source to the receiving equipment by conduction, induction, radiation, or any combination of the three. It is not difficult to see that such interference represents a serious hazard to the proper functioning of communications, radar, and other wire and radio wave-propagation services.

For the Army Technical Services and Ground Forces the Signal Corps is responsible for devising basic components, standards, principles and



"Autolite" waterproofed integrally shielded and suppressed distributor.



High tension ignition cable shielding. A. Early type; B. Braid-over-boo
C. Integrally shielded type.

techniques for the elimination or reduction of such interference, together with the necessary instruments and tools required. Typical equipments commonly used by the Armed Forces which are potential sources of radio noise interference are:

Gasoline-engine-vehicular equipment such as tanks, trucks, armored cars, motorized gun mounts, amphibious vehicles, etc. Engine-driven-generators used to power radio equipment and other electrical and electronic equipment in the field. Miscellaneous engine-driven machinery such as: air compressors, gasoline pumps, laundry units, water distillation units, refrigeration units, rock crushers, gasoline driven shovels, graders, bulldozers, woodworking saws, etc. Small rotating electrical machinery such as: dynamotors, inverters, fans and blower motors. Teletypewriter equipment. Ground radar sets of all types. Track type vehicles using rubber track-treads. Dental drills. Diathermy equipment and electronic heating equipment such as used in tire vulcanizer units, frozen food defrosters, etc.

It can be seen from this brief outline that a vast heterogeneity of potential interference-emanating equipments are involved in any theater of military operations or even in a small tactical area.

Early Suppression Development

PRIOR to World War II only a limited amount of work had been done on suppression systems for Army vehicles, and that only for a few combat and tactical vehicles designed for radio set installations which in general did not tune over 18 mc. Those systems consisted essentially of expensive flexible metal conduit, fittings and shield containers over the wiring and interference generating components, and filters of relatively great bulk and weight. They reduced spark plug life to a few hundred miles because of the lack of suppressors to protect the plug points from being burned away by the heavy capacitive discharge caused by the shielding around the high-tension leads. Frequent breakdown of the ignition cables resulted from condensation of moisture within the shielding and from deterioration of the cable caused by the interaction of moisture, ozone (resulting from corona) and atmospheric nitrogen. They were difficult to install, required frequent and expert maintenance to retain suppression effectiveness and engine operation, were high (estimated about $65.00, average) in first cost, used up several pounds of strategic brass and other metals, and were effective over too limited a frequency range, even in the rare instances when they were properly maintained.

The suppression systems developed commercially for broadcast reception in passenger vehicles before the war were unsuited to the type of radio set installation used in Army vehicles. Moreover, it was soon realized that suppression systems would be required by all Army vehicles whether equipped with radio or not, because unsuppressed vehicles can cause interference up to half a mile from a sensitive receiver. Much the same state of affairs regarding suppression also existed before the war regarding engine generators and other engine-driven, electrical, and electronic devices.

The imminence of war in 1941, led in 1941-42 to the hurried development of the Army's first effective unshielded suppression system, which, though far from ideal, eliminated to a large degree the difficulties previously encountered. The new system had no adverse effect on the life or performance of the engine or electrical components (except in the case of voltage regulator contact points life, which was later corrected). It was fairly effective over the required range up to 30 mc, required only a fraction of the strategic materials of the former system, was relatively easy to install in production and maintain by trained personnel, and has been estimated to cost only about $15.00 per vehicle. The saving on production cost alone for the 3,000,000 suppressed vehicles procured during the war may then be taken as about $150,000,000.

Interim suppression systems for other sources of interference than vehicles followed as soon as man-power and time permitted. This rapid development was possible only because of the fine cooperation with the Signal Corps by the manufacturers of the interfering equipments as well as the manufacturers of the capacitors, filters, and other suppression components. Yet, because of the early inexperience of the manufacturers, ninety-eight percent of all pilot-model suppression systems for vehicles and engine generators were designed by Signal Corps personnel on the spot at the manufacturers' plants.

In spite of the tactical success of the suppression systems devised and

put into production early in the war, however, there was always more work urgently needing to be done, for several reasons. First, the increasing frequency range used for radio communications soon outgrew the 30 mc limit of the original suppression systems as applied to vehicles. Second, the Army supply program for war, calling for immediate quantity production of what could be made then, plus what could possibly be developed in time to be of intrinsic value in successfully waging war, left no time for a basic approach to the problem of interference; acute and relentless expediency prevented the scientific determination of the design factors required for the most efficient interference suppression, and demanded the reduction of interference by quick-fix, trial and error methods and materials. Third, the increasingly scientific methods of warfare brought a rapidly increasing variety of interfering electrical and electronic equipments into close proximity with radio receivers and other interference-susceptible devices, thus requiring frequent development of new suppression systems, as the new interfering items were developed.

Noise Measurement

A COROLLARY to interference suppression is interference measurement, in order to be able to determine and to be able, in a clear-cut specification, to tell a manufacturer of suppressed equipment how he can determine whether the equipment is adequately suppressed. This was an extremely difficult problem, and numerous methods of measurement were investigated. Commercially the noise measurement art was in its infancy; however, available commercial instruments were investigated and were found to be seriously deficient from the standpoint of military requirements for use in quality control of suppression systems applied to military equipment in mass production. As a result of this situation and the unavailability of commercial instruments in sufficient quantity for Signal Corps requirements, interim measures were devised utilizing standard Signal Corps receivers, modified for use as noise meters. The urgent need for more satisfactory noise measurement instrumentation led in the last year of the war to setting a program in motion for development of such equipment suitable for military requirements.

The magnitude of the tasks accomplished, in spite of starting almost from scratch at the start of the war, is shown by the approximately 50,000 miscellaneous engines, 100,000 engine generators and 3,000,000 vehicles which were suppressed in mass production during the war.

Because of the very different conditions and requirements for the suppression of interference aboard ships and aircraft, coordination of suppression with the AAF and the Navy during the war was limited largely to cooperation on pilot model approval and production suppression tests of engine generators, and exchange of general information on suppression techniques and interference measurement.

Research Organization

INASMUCH as the successful accomplishment of the mission of the Signal Corps is vitally dependent upon the ability of all the Services of the Army to cope with the problem of reduction of the interference generated by their multiplicity of equipments, the responsibility naturally devolves upon the Signal Corps for conducting basic research and development in this field in order to provide the other Services with the necessary "know how," engineering data, and standards to assure their success. The responsibility for the actual production application and testing of the suppression systems on interfering equipments, however, after the basic fundamentals have been developed by the Signal Corps, was and still is that of the procuring Service.

Shortly after the beginning of the war the Detroit Signal Laboratory was established in Detroit, Michigan the center of the automotive industry, to implement interference reduction measures on vehicles and en-

"Champion" self-shielded spark plugs with high tension cable and fittings installed for operation.

"Autolite" integrally shielded and suppressed distributor and high tension cable, installed for operation.

gine generators, both of which were already in mass production, and to carry forward as much development work as was feasible on suppression systems and measurements.

The Detroit Signal Laboratory was deactivated shortly after the end of the war and the responsibility for suppression activities was transferred to Coles Signal Laboratory where two operating sections, the Suppression Development Section and the Suppression and Installation Application Section were established as part of the Suppression and General Engineering Branch to carry out Signal Corps suppression responsibilities. Inasmuch as this discussion concerns primarily the Suppression Development Section only the activities and program of this Section will be elaborated on.

The primary mission of the Suppression Development Section is:

(1) To design and develop filters, capacitors, suppressors, shielding methods, etc., for use in the elimination or reduction of radio interference to various communications and other radio-wave propagation services of the Army.

2() To prepare specifications for the elimination of radio-interference and to design and develop for all Army Procuring Services interference-measurement equipment to be used to determine conformance of suppression systems to applicable specifications.

(3) To design and develop interference-measuring or detecting equipment for use by field maintenance units of the using Arms to maintain the effectiveness of suppression treatment applied to electrical and electronic equipment.

Present and Future Programs

DURING the war, large amounts of empirical data were compiled, relative to the effectiveness of various suppression measures. These have now been evaluated, to serve in part as a basis for future development work in radio-interference suppression. Wartime suppression systems were only effective over limited frequency ranges—in the case of vehicles up to 4 mc and in the case of engine generator units and miscellaneous engine-driven machinery up to 156 mc. This frequency coverage in general satisfied the tactical requirements at that time. However, as a result of radio sets now in development, there is an immediate need for suppression systems effective up to 500 mc and an indicated need for systems effective to 5,000 and higher. In addition to limited frequency coverage the suppression systems in use during the war were also deficient in other respects. These systems were made up of externally-applied suppressors, capacitors, filters, shielding and bonds. Such systems, sometimes described as "Christmas Tree Suppression" because of the many gadgets externally applied, were subject to deterioration because of their exposure to extreme climatic conditions in addition to the corrosive effects suffered in tactical operations involving the fording of rivers and beach-landings. It can readily be appreciated that maintenance of such suppression systems and storage and issue of the many piece-parts of which they were comprised were problems of considerable magnitude. Another problem which arose in the case of field maintenance and repair of such items as vehicles and engine generators was the fact that in many instances maintenance personnel who were unfamiliar with suppression requirements would remove suppression elements from these equipments in normal maintenance and repair operations and would fail to replace them, inasmuch as a gasoline engine, for example, operates equally well with or without the suppression elements. The aforementioned considerations, together with the ever expanding frequency range over which suppression measures are required to afford protection and the multiplicity of new equipments being developed requiring suppression treatment, are typical examples of the problems to be resolved by the post-war interference reduction program.

The engineering and development phases of the present interference-reduction program are being prosecuted by the following general methods of attack:

(1) Redesign of electrical components and subassemblies to make them inherently noise free.

(2) Incorporation of filtering, suppression, and shielding measures as an integral part of electrical subassemblies in place of external filters, suppressors and shielding.

(3) Providing leakage paths for electrostatic charges by development of suitable bonding methods or utilizing partially conductive materials, such as conductive rubber used in tank treads and bogie-wheel tires.

(4) Elimination of corona by proper design of high tension circuits.

The aforementioned program phases are being implemented by the following additional measures:

(1) As an immediate measure, the formulation of appropriate suppression paragraphs for incorporation into equipment development specifications and equipment procurement specifications for all equipments procured by the Army which has interference potentialities; as a final measure, a general suppression specification covering all electrical and electronic devices (except for gasoline engines or gasoline engine-driven equipment). The present suppression specifications for vehicles and other gasoline engine-driven equipment are currently being revised to require effective interference suppression up to 4000 mc.

(2) The development of suitable interference measurement instrumentation to be used to determine compliance of potentially interfering equipments with suppression specifications. Such interference measurement equipment would serve the dual purpose of production quality control of suppression systems applied to electrical and electronic equipments and as a tool for use by maintenance units in the field in maintaining the effectiveness of such suppression treatment applied to these equipments. Available commercial types do not meet military requirements from the standpoint of measurement accuracy, sensitivity, ruggedness and general adaptability.

(3) Inasmuch as the interference reduction program is of service-wide interest it is being, and will continue to be, coordinated with the Air Force and the Navy Department through the Interference Reduction Sub-Committee of the Aircraft Radio and Electronics Committee of the Aeronautical Board, and the Interference Reduction Working Committee of the Panel on Communications, Committee on Elec-

tronics, Joint Research and Development Board.

(4) Coordination with industry on interference reduction matters to indoctrinate them with present and future military requirements through such well established committees as the American Standards Association Committee on Interference Measurement and the Society of Automotive Engineers Committee on Vehicular Radio Interference. International coordination has recently been effected through the ASA's delegation to the International Special Committee on Radio Interference which convened in London during October of last year. This year the meeting was held in Switzerland. Test Set AN/URM-3, which is a radio interference meter covering a frequency range of 0.15 to 40 megacycles, was exhibited before the International body at that time.

Improved Suppression

SUPPRESSION components such as resistor suppressors, capacitors, and filters are being developed in the laboratory and on development contract which will exhibit improved suppression and filtering characteristics, better temperature characteristics, greater resistance to corrosion and smaller size for special application. Test equipment and procedures have been developed within the laboratory for measuring the shielding effectiveness of metal conduit and braid shielding up to 156 mc. A Signal Corps procedural specification based upon the use of this equipment is currently being prepared. Also, standard test methods are being developed in cooperation with the Air Force and the Navy Department for testing the filtering effectiveness of suppression filters and capacitors up to 600 mc. This method when finally evolved will be the basis for a JAN Specification on suppression filters and capacitors.

Built-in Suppression

WITH REGARD to integral suppression, the ultimate objective is to incorporate into the design of each interference-producing electrical subassembly sufficient shielding and other suppression measures to provide adequate suppression of the completed equipment in production by normal assembly line techniques.

"Delco-Remy" integrally shielded coil, "Autolite" integrally shielded and suppressed distributor, and "Delco-Remy" feed through capacitor installed for operation.

The need for integral suppression of electrical subassemblies has become more important with the advent of waterproof electrical systems such as have now been standardized for all future Ordnance vehicles. The possibility of destruction or removal of suppression components in the field during maintenance operations is to a great extent eliminated by the use of integrally suppressed subassemblies. While the aforementioned considerations are important, the major factor is the improved degree of suppression effectiveness of the overall system afforded by integral suppression of the interference producing components. During the past year the development of integrally suppressed automotive electrical subassemblies has progressed in the improvement of the components previously developed as well as the inauguration of the development of integral suppression measures for a number of other electrical components. In the case of certain automotive electrical subassemblies wherein the inherent characteristic of the subassembly renders conventional methods of suppression impractical, design changes are necessary. In some instances this involves the development of a new inherently interference-free sub-assembly or a subassembly design which more readily lends itself to suppression treatment. During the past year work was begun on two different types of automotive regulators each embodying different principles of operation, but either of which would be suitable for replacing the conventional vibrating contact type regulator. Development was either completed during the past year or nearing completion on integrally shielded and suppressed spark plugs, distributors, ignition coils, and integrally shielded ignition cable.

In connection with interference measurement instrumentation, work is nearing completion on service test models of Test Set AN/URM-3. In addition, models of this equipment will be submitted to the Air Force, and BuAer and BuShips for their analysis. This test set is unique in that it incorporates an extremely stable pulse-noise generator as a noise reference standard and measures interference in terms of the calibrated output of the noise generator. The URM-3 system of measurement has promise of being far superior to present commercial systems using calibrated receivers. Test set AN/URM-3 when fully developed will permit measurement of interference field intensities, location of interference sources and the measurement of conducted interference sources by means of probes, and the measurement of conducted interference voltages present across two-terminal networks. In addition to Test Set AN/URM-3 work is under way in the laboratory and by means of development contracts to develop interference measuring equipment for the higher frequencies, utilizing the URM-3 system of measurement.

The vast integrations of electrical and electronic equipments necessitated by the increasingly scientific mode of modern warfare make it mandatory that such military equipments in the future be so designed or treated that they may be assembled in any foreseeable combination to satisfy any tactical situation without mutual interference between such equipments. Activities such as search radar, telemetering, guided missiles and fire control systems along with communications such as mobile message centers, mobile command posts, etc., and other electrical and electronic gear will under certain conditions have to be installed in close proximity to one another. This would result in a high density of potential interference sources which would be a serious hazard to the operational efficiency of the equipments involved. The interference reduction program of the Signal Corps is directed toward the elimination of all potential interference sources to such an extent that the tactical use of all electrical and electronic gear can be fully exploited without any reduction in operational efficiency due to such interference.

Letter from Germany

(Editor's Note:
This report from Germany by Col. Leo Codd, Executive Secretary, Army Ordnance Association, is so obviously an expression of conditions as seen by a patriotic American with no "axe to grind" and with no purpose in the report except to present facts, that it should interest every one of our readers. Col. Codd has done a masterful job in reporting from Germany.)

January 1948

THIS LETTER is being written in Germany where for the past five weeks I have been privileged to observe conditions in the American and British Zones. Together with thirteen other editors and publishers from the United States I have been allowed to examine every phase of the military, economic, and political aspects of the situation in this bomb-shattered land. The invitation to visit Germany was extended by Secretary of the Army Kenneth C. Royall and by Lieut. Gen. Lucius D. Clay, the American Military Governor.

The tour has included extended visits to Berlin, Vienna, Trieste, Nuremberg, Berchtesgaden, Munich, Frankfurt, and the Ruhr (Dusseldorf, Essen, Cologne). Subsequently I visited London and Paris. The group of editors and publishers are deeply indebted to all the officials—American, British, German and Austrian—who placed at our disposal all the facts of the present situation and who were so hospitable at every turn.

It has become an American habit—acquired during the past year by businessmen, legislators, journalists, and the clergy who have made similar short visits—to diagnose the plight of Europe and prescribe a cure. Neither by ability nor inclination can I pretend to follow in their footsteps. My purpose is merely to report to members of the Army Ordnance Association some of my observations and my conclusions based on facts and figures from many sources. The sources ranged from 4-star generals and chancellors on the one hand to taxi drivers and prisoners of war on the other. Of one thing I am certain—but for Russia we might pack up and come home.

Europe is not as economically or politically sick as we are led to believe. Despite the wreckage of her cities, the confusion of her thought, and the sharpness of her suffering, those qualities of her people which have predominated for centuries are still present, and she will survive despite the jargon of cultural star-gazers at home and abroad. Many sections of Europe are fast returning to normal. But there stands Russia midway across Europe and doing her best to go all the way. So our military experts say, and rightly so, we must keep our military force ready to stop the aggressor in his tracks.

The military situation is as simple as that, but, unfortunately for us at home, there has been so much hysteria injected into our consideration of European economic and political problems that we are manufacturing crises which often do not exist. Europe's problems will not be solved by Russian Communism nor by British Socialism nor by an American mixture of both. They will be solved, in the opinion of seasoned observers, by democratic processes which, if I remember correctly, World War II was fought to preserve for ourselves and for posterity.

Be it said to the lasting credit of our military officials in Germany that since July 15, 1947, our policy has been administered with charity and firmness toward this goal. Formerly our goal, as established in the Morgenthau policy of revenge, was to convert Germany into a goat pasture. That stupid concept has been discarded.

Now our goal is more reasonable. While determined to stand guard over the disarmament and demilitarization of Germany, we are trying, under the sterling leadership of General Clay, to bring about stable political and economic conditions. We are making good progress. With Russian cooperation the job would be easy. Without that cooperation, as at present, the going will be difficult, long-delayed, and continuously explosive.

The military situation in Germany, in so far as the United States Forces of Occupation are concerned, is well organized and splendidly staffed in all departments. I doubt that there has ever been a better peacetime segment of the United States fighting forces. Its morale is high. Its precision and attitude are excellent. It has outstanding leadership in all departments.

Our mission in Germany, as throughout the world, is just and lasting peace. Such peace can be achieved only if conditions of public order and prosperity are created in Europe as a whole. An orderly and prosperous Europe requires the economic contributions of a stable and productive Germany as well as the necessary restraints to ensure that Germany is not allowed to revive its destructive militarism.

Two and a half years after the bombs stopped falling only Russian opposition to these peaceful goals stands in the way. One has only to see the Russian tactics at first hand to be convinced that this cold war may flare into white heat in an instant. The situation in this respect is touch and go in Berlin itself, in Austria, and in Trieste. In these hot spots especially, Russian tactics are conspicuous by their determination to create world chaos.

In Europe, Russian strategy takes a definite form which always falls into one of the following eight categories of propaganda: (1) America stands for the capitalist and imperialist exploitation of the common people; (2) We are torn by racial, class, and sectional conflicts; (3) We are on the brink of economic disaster; (4) We are trying to control small countries economically; (5) We are administering the German occupation to exploit the German people and to seize permanent control of German resources; (6) We are in collusion with German reactionaries to restore Facism; (7) We are opposing vital German interests; (8) We are splitting Germany to form an anti-Soviet bloc.

In the face of these blatant falsehoods the position of our military forces of occupation assumes added importance. Not only must we keep the Germans demilitarized, but our erstwhile partner in the enterprise must be told in no uncertain terms that we, too, mean business—else the few remaining ideals for which the war was fought will succumb to Communism and Russian military might.

Hence our military position in Europe calls not only for an alert constabulary to police the German people in cooperation with their own police forces but a strong, alert United States Air Force and Navy to prevent any breach of the peace by the forces of Communism. This we are doing with excellent success thus far.

It is perfectly obvious that the job of our military in Germany is no-

where near completion even if the Russians threat were removed. We can thank our stars that it has not been turned over to starry-eyed theorists who seem so willing to sell our American freedom down the river in the name of improved "cultural" relations. Under the most favorable conditions we will have to keep a military force in Germany, even though small, to see that these leaderless people do not break the peace for many years to come. So much for what the military experts hold. All the evidence indicates they are dead right.

On the German economic front the answer is not nearly as clear-cut. The people of Germany and Austria still suffer from chronic hunger. The housing situation is tragic. Shoes and clothing are in urgent demand. Food, shelter, and clothing are the immediate pressing needs. These are matters of charity, and it would seem that the American Red Cross or some other nonbureaucratic private agency could help. The magnificent work of ex-President Hoover in helping alleviate the serious food condition is worth ten million mimeographs in selling the American Way in these bomb-torn lands.

Another American who has contributed greatly in charting the way to a solid solution of Germany's economic ills is Lewis H. Brown, chairman of Johns-Manville Corporation, whose "Report on Germany"—submitted last month at the request of General Clay—makes the best sense of all the reports that have been made by the visiting experts.

Politically, Germany is in a turmoil. Conservative opinion prevails in the party elections. Efforts are being made by American Military Government to promote the development of popular self-government. The formation of political parties whose programs, activities, and structure demonstrate their allegiance to democratic principles is being urged. Denazification courts, administered by the Germans themselves, go on apace. The War Crimes Courts still grind on very much after the fashion of a Senate Investigating Committee. Both should soon come to an end. Civil courts and judicial procedures are being safeguarded.

Probably the most difficult of pressing political problems are the third of a million displaced persons —refugees and expellees—now in the American Zone in Germany. Some of their camps—I visited many—are models of cleanliness, thrift, and good fellowship. This is notable among the Balts—the Lithuanians, Esthonians, and Latvians—who have been thrown out of their homes by the Russians. These fine people would make valuable additions to any populace. So, too, would many of the displaced Poles and Ukranians. Many of the other camps are a disgrace. Despite their poverty-stricken atmosphere they have the food. In one that I visited it was said the inmates could produce anything at black-market prices from a sable coat to a Leica camera!

The prisoner of war situation is deplorable. Many thousands are still held in Russia and in France. Those who are returned by Russia from time to time are the most pitiable objects of starvation and suffering one could imagine.

Most serious of all German needs is a new and stable currency. Two and a half years after the shooting has stopped, Germany is still on a "cigarette economy." Given a new currency, a central bank, a central government, and help to an export trade in those quality commodities for which Germany is famous, the European economy will improve.

Some observers contend, and I am among them, that two things should be stopped immediately: The further dismantling of manufacturing plants and the denazification of all except the top Nazi party leaders. Communism will not be stopped at the Iron Curtain if these disturbing factors and discordant influences are not soon eliminated.

We continue to strip industrial plants with our right hand and send their machines as reparations to Yugoslavia, for instance, while with our left we urge the rebuilding of industry to restore German economy. A contradiction in deeds if there ever was one!

At the great B.M.W. aircraft engine works in Munich I saw the complete dismantling of a modern plant—500 carloads of machines have already been shipped to Yugoslavia and 600 more carloads are in process of shipment. In one corner of that great plant the company is trying to give employment to a few starving Germans by manufacturing a primitive plow. In the plant yard is a vast underground air-raid shelter which is also used for storage of parts and tools. When all the machinery has been removed, this huge installation is to be blown up!

Yet our experts are going to great lengths to return Germany as a self-supporting member of the European economy. That sort of thing impresses many people as sheer stupidity. And it is not helping to lessen the terrific load on the American taxpayer.

In conclusion let it be repeated that the Germans deserved what they got and more. Their perfidy and cruelty have cost the world a price in lives, in culture, and in wealth for which adequate restitution can never be made. The judgment of history will so record. But we will be stupid indeed if in our hatred of National Socialism we close our ears to its equally cruel and destructive ally — Communism — the knock of whose slimy hand is already at our door.

From an industrial-preparedness point of view one cannot survey the ruins of Europe without profound respect for air power as an element of modern warfare. Surely the handiwork of our airmen, backed by the power of American science and industry, was a predominant force in clearing the way for our armored legions in their victorious Jacksonian tactics. Here is resounding argument that our supremacy in the field of scientific and industrial preparedness must be maintained indefinitely.

But there are more personal conclusions than these. He would be a wise citizen in the United States who would buy himself a farm. The city dweller in modern war suffers far greater damage than his rural brother. Nor when the bombs stop falling is the farmer faced with sure starvation. Again, the American manufacturer would be prudent never again to build a factory in or near great concentrations of industry. Such a locale is doomed to certain destruction in modern war.

This then is my conclusion after a month-long study of Germany and her people: A cruel and formidable foe has been defeated, devastated, and his leaders put to death. We have renounced the un-Christian precept of vengeance. Wisely would we follow the plea of Lincoln: "With malice toward none, with charity for all, with firmness in the right as God gives us to see the right let us strive to finish the work we are in." And in so striving may we Americans, with God's help, maintain the strongest Air Force, the mightiest Navy, and the strongest Army until the far-off day when some parliament of God-fearing nations offers a more certain guarantee of international justice and peace.

L. A. Codd
Editor

ASSOCIATION AFFAIRS

ARMED FORCES COMMUNICATIONS ASSOCIATION

OFFICERS

President: David Sarnoff
1st Vice-Pres.: Wm. J. Halligan
2nd Vice-Pres.: Darryl F. Zanuck
3rd Vice-Pres.: A. W. Marriner
4th Vice-Pres.: Jennings G. Dow
5th Vice-Pres.: E. K. Jett
Counsel: F. W. Wozencraft
Exec. Sec. and Treasurer: Brig. Gen. S. H. Sherrill, U.S.A., (Ret.)

DIRECTORS

Paul Galvin (1949)
H. A. Ehle (1949)
Dr. J. A. Stratton (1949)
J. Harry LaBrum (1949)
John J. Ott (1949)
Dr. Harold A. Zahl (1949)
Carroll O. Bickelhaupt (1950)
Theodore Gary (1950)
Thomas H. A. Lewis (1950)
Thomas A. Riviere (1950)
Dr. Lee De Forest (1950)
William C. Henry (1951)
Dr. Frank B. Jewett (1951)
Fred R. Lack (1951)
Leslie F. Muter (1951)
Charles E. Saltzman (1951)
S. H. Sherrill (1948)

AFCA

As long ago as April 1947 it was realized that when unification of the Armed Services became a fact our association should change its name and serve the interests of Army, Navy and Air Force in our fields. Our constitution recognized this. Other associations whose missions parallel ours in other fields had the same thought and took such action as was necessary in their cases.

Army Ordnance Association, now 28 years in existence, has changed its name to American Ordnance Association. The Society of American Military Engineers, in existence equally as long, found no need to change its name. Both of these associations have adequate financial reserves accumulated through the years and their work is known by Navy and Air Force staffs and personnel.

Our association name has not been so long in existence, and while we regretted the necessity of making a name change it certainly is in the spirit of the times to do to in the interest of progress. We had to have a name that would leave no question in the minds of any prospective members with Navy or Air Force interest that the Association is not controlled by any one of the three armed services. That meant the elimination of the word "Army" and the word "Signal," since the latter word is not used in the title of the "Chief of Naval Communications" or the "Air Communications Officer." And since "Armed Forces" is used in the name of the "Industrial College of the Armed Forces" and elsewhere it seemed in order for us to use it. Therefore, after the most careful study and consideration the Board of Directors adopted, on December 11, the name favored by the greatest number of the members who voted in October and November — "Armed Forces Communications Association" (AFCA).

Perhaps the most difficult decision was the advisability of including the word "photographic" in the name. It was finally decided that to do so would make the name too cumbersome. The interests of the three Armed Forces in photography, however, will continue to be one of our chief interests, just as they were in the Army Signal Association which did not include the word "photographic" in its title.

An amendment to the Certificate of Incorporation under the laws of the District of Columbia has been approved and the Association is now incorporated as "Armed Forces Communications Association."

Two new directors and vice-presidents were elected to fill existing vacancies until the regular election in April 1948. They are Jennings Dow, formerly of Navy Communications, and E. K. Jett, who, on the last day of 1947 resigned from the Federal Communications Commission, to join the publishers of the Baltimore Sun as vice-president and radio director.

The directors have every confidence that through aggressive action in the several chapters and in areas where chapters have not yet been formed, our membership will be

WHY UNIVERSAL MILITARY TRAINING?

Dr. Karl T. Compton, President of MIT:

"We now know with certainty that the pacifist sentiment which swept this country in the 1920's and 1930's formed the basic enouragement which led Hitler, Mussolini, and the war lords of Japan to embark on their programs of military aggression and conquest, and thus precipitated World War II.

"Prompt enactment of Universal Military Training is urgent. With every passing month our reserves of military strength left over from World War II are declining. It will take at least five years, after the legislation has been passed, to get the UMT program into full operation. Meanwhile the fate of the free peoples of the world is largely dependent on the maintenance, by the United States, of a strong military posture—at least until the United Nations can work out some better long range plan. Action is needed now! Later may be too late."

CHAPTERS AND SECRETARIES

BALTIMORE: Col. Arthur Pulsifer, Sig Sec., Hq. 2nd Army, Ft. Meade, Md.

BOSTON: Capt. F. P. Singleton, Boston Army Base, Boston 10, Mass.

CHICAGO: Col. Raymond K. Fried, 111 West Monroe St., Chicago 3, Ill.

CLEVELAND: C. L. Haas, 2814 Hampton Road, Rocky River 16, Ohio.

DALLAS: Major Warren S. Hatfield, 4927 Linnet Lane, Dallas, Texas.

DECATUR: Mr. E. C. Whitcomb, RR 6, Box 263, Decatur, Ill.

EUROPEAN: Col. E. F. French, OTC SigO, APO 757, c/o Postmaster, New York, N. Y.

FAR EAST COMMAND: Miss Helen M. Reynolds, Sig Sec., GHQ, FEC, APO 500, c/o PM, San Francisco, Calif.

FORT MONMOUTH: Dr. Virgil Payne, 400 Atlantic Ave., Long Branch, N. J.

KENTUCKY: Capt. John A. Short, Lexington Signal Post, Lexington, Kentucky.

NEW YORK: Lt. Col. F. H. Fay, 32 Ave. of the Americas, New York, New York.

OGDEN-SALT LAKE: Miss Marjorie Hansen, M-4 Bonneville Pk., Ogden, Utah.

PHILADELPHIA-CAMDEN: G. O. Peters, Plant Engr. Agency, 17th & Sansom Sts., Philadelphia, Pa.

PITTSBURGH: Capt. J. J. McGovern, 434 Beverly Rd., Pittsburgh, Pa.

RICHMOND: Miss Jean Melton, Ches. & Potomac Tel. Co., 703 E. Grace St., Richmond, Va.

RIO: Major Huston Maxwell, JBUSMC, APO 676, c/o PM, Miami, Fla.

SACRAMENTO: Lt. Col. C. H. Melvin, Jr., Sacramento Signal Depot, Sacramento, Calif.

ST. LOUIS: Henry C. Hughes, 8506 Stanford Ave., St. Louis, Mo.

SEATTLE: Capt. Lawrence W. Bucy, Alaska Communication System, Seattle 4, Wash.

WASHINGTON:

STUDENT CHAPTERS

CORNELL: John M. Ross, 126 McFaddin Hall, Ithaca, New York.

OKLAHOMA A & M: W. L. Covel, Mil. Dept., Okla. A & M College, Stillwater, Okla.

TEXAS TECH: Rush D. Robinett, Mil. Science Dept., Texas Tech. College, Lubbock, Texas.

UNIVERSITY OF CALIFORNIA: R. G. Barhite, Bowles Hall, Univ. of Calif., Berkeley, Calif.

All members of the Association who are not members of local chapters, and who live at places where attendance at local chapter meetings is practicable, are urged to write to the secretary of the nearest Chapter and apply for membership. These Chapters are organized under individual constitutions and by-laws which authorize them to impose Chapter dues, to decide upon membership, and to set up requirements not inconsistent with the approved constitutions and by-laws. Chapter meetings at which military communications and photography subjects are discussed by well-informed speakers, or pertinent films shown, are held periodically. Programs for meetings are arranged by the officials of the Chapters.

It is desirable that new Chapters be organized in all places where they are likely to be strong and permanent, but not at places where they would be likely to become inactive soon.

Those chapters which charge local dues have set them at a modest amount.

more than doubled in 1948 from those whose first interests are in Navy or Air Force communications or photography. We have a splendid opportunity to assist in bringing the three services closer together as a part of the new team in the National Military Establishment. That is one of the greatest contributions our association can make toward National Security.

Other Action by the Board of Directors

1948 Meeting: Favorable progress toward having this year's meeting and exhibition at Wright Field and Dayton was reported. Full details will be published to the members in a special bulletin in February.

Financial: The report of the Association's financial condition previously furnished to the directors was discussed. The Executive Secretary emphasized the need for more income especially from group memberships and advertising. One of the other Associations has reported a deficit of $5,000 for the first 8 months of 1947, this despite an increase of rates in July to $5.00 per year and due chiefly to a drop in advertising revenue of $7,000 during that period. Our own status is about identical with what it was a year ago, $11,588, income being required to reach the same balance we had on 30 June 1947.

Advisory Committees: Mr. Fred R. Lack, Chairman of the Association's General Manufacturing Committee, to whom a number of problems on industrial mobilization received from the Armed Forces have been submitted for solution reported progress made by him and by those he has invited to assist him. Mr. Lack has set up sub-committees of experts who are studying these problems.

Association Officers: All directors and officers occupy the same positions in the New Association and the constitution adopted last April will govern.

Emblem

The Association's emblem appears on the front cover and elsewhere in the magazine. The central figure is an alert powerful American eagle with strong talons clutching lightning flashes—symbolic of a strong America and national defense—especially insofar as modern communications is concerned, our basic reason for existence. The border consists of leaves of the olive branch of peace, showing that the object of military preparedness in America is to assure a lasting peace. In the background are signal flags—a means of signaling used on shipboard in the Navy and in some Army and Marine units. Just above the eagle and between his outstretched wings is a heavy bomber in flight, symbolizing the complicated and essential communications in the air Force, and in Naval and Marine aviation. Above that is a radar antenna array, and at the very top a radio relay antenna—for the latest major step in military communications. And none of these could exist without industry—the foundation of AFCA. In the color version there are the traditional colors of the signal flags—dexter white flag with red center and sinister red flag with white

center—with a gold border to the whole. Since communications and communications equipment are essentials in every one of the Armed Forces, each of which has an official color or colors, it was decided not to include any service color in the insignia since all could not be shown.

Honor Roll

For many years the Infantry Association has listed units for its Honor Roll as those which indicate one hundred per cent support of the aims and purposes of the Association by having every officer of the unit a member, and a subscription for each of its recreation rooms. The Association reports that through this support it is able to maintain the high standards of the Infantry Journal as a magazine for the combat soldier. Some units have been carried on the Honor Roll for as much as twelve years. Our Association announces a similar Honor Roll beginning January 1, 1948. A communication or photographic unit of the Army, Navy, Marines or Air Force will be listed on this Honor Roll as soon as it can report membership by every one of its officers and the necessary subscriptions to the magazine.

Chapter of the Year

In the October Bulletin it was announced that a "Chapter of the Year" would be chosen annually and announced in May. Data required for the selection of the 1948 winner is being received at National Headquarters. In May a committee will be appointed by the Board of Directors to study the data and select the winner.

Points will be earned on the following basis:

(a) Each meeting held by a Chapter from November 1, 1947 to April 30, 1948—1 point.
Example: A Chapter which held one meeting per month during this period would earn 6 points.

b) The percentage of active members present at each meeting, times the number of meetings.
Example: A Chapter which had 40% of its members present at each of these meetings would earn 6 times .40, or 2.40 points.

(c) The percentage of active strength of the chapter as of November 1, 1947 that has been added in new members, times 5.
Example: A Chapter which on November 1st had 100 members and, between that date and April 30, 50 more members in that area joined, would have a percentage of 50% and would earn .50 times 5, or 2.50 points.

(d) The percentage of renewals and "pick-up" from April 1, 1947 to April 30, 1948 times 10. (A "pick-up" is a former member who failed to renew upon expiration, but who later renewed his membership.)
Example: A Chapter having 500 active members on April 1, 1947, of which, during the period indicated, 100 renewed, would have a percentage of 20% and would earn .20 times 10, or 2 points.

Perfect score for a Chapter that had a meeting each month during this period, perfect attendance at each meeting, and doubled its membership would be 27 points.

National Advisory Committee Chairman Reports:

As you undoubtedly know, your Association has established a number of National Advisory Committees to implement the purposes of the Association and to explore all avenues of cooperation between it and the Armed Forces. As Chairman of the Advisory Committee, representing communication equipment manufacturers, I would like to report on the work that we have now under way in the area of industrial mobilization planning. I am sure there is no need of impressing upon the readers of SIGNALS the great importance of this planning, but with the many day to day tasks of our peacetime pursuits we are apt to take a "Let George do it" attitude when asked to help with these plans. This attitude may mean the end of our present way of living in the United States. So you owe it to yourself when asked to devote some time to this activity to pitch in and do a job.

As the Chief Signal Officer, General Spencer B. Akin, reported at the annual meeting of the New York Chapter on 15 October, there have been seven problems submitted to your Association dealing with industrial and manpower mobilization. Five of these are directly concerned with the design and manufacture of communication equipment. Typical of these problems is a study to determine those items which caused manufacturers of communications material the greatest difficulty during World War II and suggestions for ways and means for getting around these difficulties. Another asks for industry's recommendation for a substitute for the dollar unit as a measure for the production capacity of the electronic industry.

Believing that these problems can best be handled by existing trade and technical organizations who are directly concerned, your chairman has asked the Radio Manufacturers Association to set up a task committee to consider four of these problems with respect to the manufacture of electronic equipment. It is hoped that this committee will be implemented at the next meeting of the RMA in Chicago on January 22.

At the same time another problem, concerned primarily with development and design, is being considered by a joint committee of the Institute of Radio Engineers and the Engineering Division of RMR, under the chairmanship of Murray G. Crosby.

Inasmuch as these problems are not peculiar to radio but cover the entire communications field, these same problems have been submitted to Mr. C. D. Manning, Chairman of the Telephone Equipment Manufacturing Committee. Mr. Manning may either set up a special committee for this work or it may be referred to the Telephone Equipment Section of the National Electrical Manufacturers Association. These same problems are also being referred to the other industry Advisory Committees for action. — *Fred Lack, Chairman, Advisory Committee on Communication Equipment Manufacture.*

•

CHAPTERS

Baltimore

Walter Evans, Chapter President, in addressing representatives of the electronic industries of the U. S. at the Electronics Convention in Chicago recently, emphasized the continuing need for cooperation between military leaders and research and development activities in industry. He said, "A unity of military and research talent *now*, not after a military emergency is at hand, promises our best hope for lasting peace"; and recommended "a great research organization to snatch from science new secrets that will keep us strong." Later, Mr. Evans and Colonel Pulsifer, Chapter Secretary, conferred with the Executive Secretary in Washington.

The Executive Secretary at a later date discussed with Major General McAuliffe of Bastogne fame, now secretary of the Research and Develop-

NATIONAL ADVISORY COMMITTEE CHAIRMEN

GENERAL MANUFACTURING: Mr. F. R. Lack, V. P. in charge Radio Div., Western Electric Co.

BATTERY MANUFACTURING: Dr. George W. Vinal, Bur. of Standards, Wash., D. C.

DRY BATTERY SUBCOMMITTEE: Mr. Ralph E. Ramsay, V. P. & Research Director, Ray-O-Vac Co.

STORAGE BATTERY SUBCOM: Mr. L. E. Wells, Chief Engr., Willard Storage Battery Co.

COMMUNICATION EQPT. MFG.: Mr. F. R. Lack

RADIO MANUFACTURING: Mr. F. R. Lack

TELEGRAPH EQPT. MFG.: Col. J. Z. Millar, Western Union Telegraph Co.

TELEPHONE EQPT. MFG.: Mr. C. D. Manning. V. P., Kellogg Switchboard & Supply Co.

COMPONENTS MANUFACTURING: Mr. R. C. Ellis, Raytheon Mfg. Co.

MILITARY TRAINING: Major. Gen. G. L. Van Deusen (Ret.)

PUBLICITY: Mr. Roland C. Davies, Telecommunications Reports,, Wash. D. C.

ment Board—established under the National Security Act of 1947 and headed by Dr. Vannevar Bush, the suggestions of Mr. Evans. The chairman of the Board's committee on Electronics is Dr. Julian Stratton, Massachusetts Institute of Technology, and one of our directors; also on duty with the Board is Colonel Simpson, formerly a director of the Signal Laboratories at Fort Monmouth.

Chicago

Newly elected officers are U. N. Sanabria, President; C. T. Read, 1st Vice-president; O. Read, 2d Vice-President; Leslie Muter, Treasurer; J. F. Novy, Asst. Treasurer and Raymond K. Fried, Secretary.

Brig. Gen. S. H. Sherrill, Executive Secretary, attended a meeting in Chicago in November with Mr. Leslie Muter and Col. R. K. Fried. Following this conference an announcement was made of a "Preparedness Plan" being studied under the chairmanship of Mr. U. A. Sanabria, president of American Television, Inc., and the Chicago Chapter.

Details of the plan will be submitted in the near future through National Headquarters of AFCA to the Armed Forces.

Cleveland

The Cleveland Chapter enjoyed an interesting talk given by Brig. Gen. W. O. Reeder, Deputy Chief Signal Officer, at its November meeting. General Reeder's topic concerned spare parts, economy, and component standardization in the electronic and general signal equipment fields. The far-seeing possibilities for simplification of inspection, supply, and transportation are being sought by the Army and these were stressed in understandable language colored by General Reeder's personal observations on interesting experiences in the China-Burma-India Theater.

General Reeder also commended the industrial effort during World War II and spoke of the vast contribution to the Arms and Services made by industry and civilian personnel.

Those of us in the Cleveland Chapter who had the good fortune to serve under Gen. Reeder also know the value of his superior leadership.

At the January meeting the new television station, WEWS, was inspected by the members of the Chapter. The February meeting will be sponsored by the Coast Guard and will feature communications and electronic activities of that service in the Great Lakes area. Meetings are scheduled for the second Thursday of each month. Members of out of town chapters are invited to attend whenever they are in Cleveland.

Dallas

Dallas, one of the most recent Chapters to be formed, and the first in the southwest and in the Fourth Army area, is already planning a luncheon meeting, January 23, at which Major General S. B. Akin will be present. This Chapter will act as our Association's agent in sponsoring the Industry-Army meeting on that date, when General Omar Bradley will be the principal speaker.

L. B. Redmond, one of the initial staff officers at Camp Kohler, was elected president and H. L. Revnolds, who served in the southwest Pacific, North African and Mediterranean theaters during World War II, was chosen 1st vice-president. Major W. S. Hatfield is the Secretary-Treasurer.

Decatur

On December 11 members of the Decatur Chapter held their monthly meeting with Colonel W. W. Jervey, Chief Army Pictorial Service, as the principal speaker. Col. Jervey spoke on the mission of the Signal Corps to all other services in a photographic vein. His address on the setup of the Pictorial Service, and the making of all types of training and entertainment film for all the Services was very instructive, and showed the members how important this service is to National Defense. Col. Jervey showed the sound movie of the Rocket Project at White Sands, and the Decatur Chapter recommends the film to all other chapters.

Among the distinguished visitors was Col. A. M. Shearer, Commanding Officer of the Sacramento Signal Depot, who made a few remarks about the organization of the Sacramento Chapter. Another visitor was Col. G. E. Popkess, Jr., President of the St. Louis Chapter. Officers for the year were introduced, and they are: E. A. Schultz, President; W. R. Winn, 1st Vice-president; D. F. Hazen, 2nd Vice-president; E. J. McCarthy, Treasurer, and E. C. Whitcomb, Secretary.

Far East Command

The petition for charter was recently received at National Headquarters. The Chapter will cover the Japanese area, Philippines, the Marianas, Ryukyus and Korea. Interim officers are: Brig. Gen. G. I. Back, president; Col. James D. O'Connell and Mr. A. J. Allen, vice-presidents; Miss Helen M. Reynolds, secretary; and Lt. Harry H. Marts, treasurer.

Fort Monmouth

Col. W. A. Beasley, Director, Squier Signal Laboratory, gave a discourse on "Signal Information Monitoring Companies," as developed and operated in the ETO, at the joint meeting of the Ft. Monmouth Chapter and 187th OR Signal Group last November. Major George P. Sunshine, Unit Instructor, explained the new career plan for enlisted men.

Kentucky

The Charter will be presented at a formal meeting at the Lexington Signal Depot by the Chief Signal Officer, Major General S. B. Akin, at some future date. Chapter officers

are Col. R. C. Hildreth, president, and Capt. J. A. Short, secretary-treasurer.

Pittsburgh

Major General W. O. Reeder, Deputy Chief Signal Officer, addressed the members of the Chapter in January. Col. R. O. Disney, Chapter president, who served with Gen. Reeder in the China-Burma-India theater introduced him.

Rio

The first foreign Chapter, other than those in occupation areas, was recently formed in Rio. Its officers are: president, Col. G. P. Dixon; 1st and 2nd vice-presidents are Col. H. G. Messer and Lt. (JG) Verlen E. Pruess; secretary, Major H. E. Maxwell; treasurer, T. D. Christian, and assistant treasurer, Lt. Col. R. B. Miller.

Sacramento

One of our most active Chapters is Sacramento, and one of their principal activities is getting good speakers to address their members. At a meeting held last year 135 radio amateurs and others heard Capt. John Reinartz, USNR, lecture on "Simplified 2-meter Control." Capt. Reinartz, presently in charge of radio amateur activities for a large manufacturer, began his career with a spark transmitter on his father's farm in 1908. He served in World War I, and during the last war he was in the offices of the Director of Naval Communications and later in charge of the Radio Division of Naval Research Laboratories. Lt. Col. Melvin, Chapter secretary, stated in his report to National Headquarters that the lecture was excellent. As a means of publicity for the Chapter an article appeared in the local newspaper announcing the meeting.

St. Louis

Colonel F. E. Kidwell, of Chicago, presented Col. C. Edwin Popkess, Jr., with the Chapter Charter at a special meeting at the Mark Twain Hotel in November. Col. Popkess has written Colonel Kidwell did a splendid job, and his talk was well received by the entire organization.

Salt Lake-Ogden

The first formal meeting was held October 29 at Graycliff Lodge in Ogden Canyon, at which time Lt. Col. D. O. Toft, Signal Supply Officer of Utah General Distribution Depot, gave a resume of the Association and formally presented to President Don Moore the Chapter Charter. Colonel John Sampson, Unit Instructor of the National Guard in the area, gave an interesting talk on the operational end of Army communications and related various actual combat experiences where it was most important to communicate.

Seattle

On December 9, 75 members held an organizational meeting, at which Major J. B. James, Capt. O. K. Maxwell and Capt. A. M. Fernandez addressed the members on "Signal Communications presently operating in the Pacific Northwest and Alaska." The interim officers are: Fred W. Kerr, president; E. O. Mickelson, 1st vice-president; Donald M. Shute, 2nd vice-president; Capt. L. W. Bucy, secretary, and John F. Rozanski, treasurer.

STUDENT CHAPTERS

Cornell

Cornell University students interested in ROTC Signal Corps recently formed a Chapter, and are well under way recruiting new members.

NEW ASSISTANT EDITOR

Mr. Harold J. Wheelock, who assumed the duties of assistant editor in September, 1946, resigned in November to return to California because of ill health by a member of his family. Mr. Wheelock during the period he served as assistant editor helped to make SIGNALS one of the most highly regarded of the service journals. His experience in writing and publication work, as well as his ability to present matters in a highly pleasing manner, contributed a great deal to the success of the magazine during its first year. His replacement is Mr. Wallace R. Fingal, who served in the Air Force on public relations work both in the U. S. and in the European Theater of Operations. He had considerable experience during his service with public relations and Army newspapers and their publications.

Unfortunately he is being handicapped at the start because the constantly rising costs of printing for the magazine, promotional campaigns, and of overhead, have made it imperative that the number of illustrations in the magazine be drastically reduced.

CONTEST WINNER

With the ringing in of the New Year the Circulation Department totalled the membership returns of the units sending in the greatest number of applications, both new and renewal memberships. A special scroll is in the process of being printed for the 72nd Sig Sv Bn, APO 503, in Japan for sending in 3 life members, 8 full and 217 associate members.

Winners of the unit membership contest for 1947:

Greatest number of members—72nd Signal Service Bn.

Largest percentage of total strength joining the Association — 304th Signal Operations Bn.

Honorable mention:

71st Signal Service Bn.

All of the above are in the Far East Command.

69th Photo Service Unit, ETO.

COORDINATING COMMITTEE FOR MILITARY ASSOCIATIONS

The usual monthly meeting held in November was high-lighted by the presence of guests of honor Secretary of Defense J. V. Forrestal, and the Honorable W. Stuart Symington, the Honorable Kenneth Royall, with Secretaries of the Air Force and Army. Ludlow King, chairman of the committee briefed the secretaries and their staffs on the military associations the informal but effective results of CCMA and its desire to extend the same type of cooperation to the Navy and Air Force that was extended to the Army before unification. He pointed out "that the Armed Forces should study their capabilities, encourage cooperative actiivties, and learn how to make maximum capital of these organizations."

GROUP AND LIFE MEMBERS

The following organizations have become Group Members of AFCA:

Capitol Radio Engineering Inst., Inc.

Lasting Products Company.

New Life Members of the Association are:

Major Joseph T. Bernard
Major Lloyd D. Colvin
Dr. Garrett D. Combs, BS sc
Pfc. David M. Dixon
Captain Gabriel W. Marnoch
Lt. Col. Jack Nahas
Col. Peter C. Sandretto
Captain George W. White
Captain William F. Wisner

"Our American concept of radio is that it is of the people and for the people."

Freedom to LISTEN – Freedom to LOOK

As the world grows smaller, the question of international communications and world understanding grows larger. The most important phase of this problem is *Freedom to Listen* and *Freedom to Look*—for all peoples of the world.

Radio, by its very nature, is a medium of mass communication; it is a carrier of intelligence. It delivers ideas with an impact that is powerful . . . Its essence is freedom—liberty of thought and of speech.

Radio should make a prisoner of no man and it should make no man its slave. No one should be forced to listen and no one compelled to refrain from listening. Always and everywhere, it should be the prerogative of every listener to turn his receiver on or off, of his own free will.

The principle of *Freedom to Listen* should be established for all peoples without restriction or fear. This is as important as *Freedom of Speech* and *Freedom of the Press.*

Television is on the way and moving steadily forward. Television fires the imagination, and the day is foreseen when we shall look around the earth from city to city, and nation to nation, as easily as we now listen to global broadcasts. Therefore, *Freedom to Look* is as important as *Freedom to Listen,* for the combination of these will be the radio of the future.

The "Voice of Peace" must speak around this planet and be heard by all people everywhere, no matter what their race, or creed, or political philosophies.*

David Sarnoff

President and Chairman of the Board,
Radio Corporation of America.

**Excerpts from an address before the United States National Commission for UNESCO.*

RCA **RADIO CORPORATION of AMERICA**

FREEDOM IS EVERYBODY'S BUSINESS

SIGNAL COMMUNICATIONS FOR OPERATION SEMINOLE

By Capt. Edward O. Ringland
Asst. Signal Officer, Fourth Army

On 31 July 1947, General Headquarters, Gulf Theater of Operations, Fort Sam Houston, Texas, issued the initial directive for Exercise Seminole stating that the operation would be a training exercise, would be executed under assumed tactical conditions to repulse an enemy force from the United States, and would take place on or about 3 November 1947.

This exercise, being a landing of armored forces onto a previously established beachhead, posed few problems from a signal communications standpoint. This fact, and the additional fact that no land maneuver would take place, eliminated the need for all except the barest minimum of tactical communications, and permitted the installation of communications within the beach area several days prior to the actual exercise.

The troop list accompanying the theater directive assigned as signal troops, one company of the 51st Signal Operations Battalion, the 20th Air Ground Liaison Company and two combat assignment teams of the 167th Signal Photo Company.

The 2nd Armored Division, the division selected to participate in the exercise, had no signal company, so the 20th Air Ground Liaison Company was divided, part of it being used as The Division signal company and the balance as a Joint Assault Signal Company. Since Theater Headquarters was to operate communications installations at two widely separated points, Company A of the 51st Signal Operations Battalion was also divided. One part, consisting of one officer and forty men, installed and operated communications at the San Jacinto Ordnance Depot, Houston, Texas, the port of embarkation. The balance installed and operated communications for Director Headquarters in the maneuver area near Panama City, Florida.

The communications installations at the port of embarkation, although not elaborate, proved to be adequate. Facilities installed included one central office set TC 4 connected by four trunks to the permanent switchboard at San Jacinto Ordnance Depot, and twenty-two locals approximately five miles long providing service down to company level, and one long local to the USS Mt. Olympus, berthed at Houston, Texas. The land-line teletype installation at San Jacinto Ordnance Depot consisted of two Western Union circuits from the port of embarkation to Houston, Texas, for official messages and for press releases. The permanently installed TWX machine at San Jacinto Ordnance Depot was also utilized for official wire messages.

Wire communications at Director Headquarters, in the maneuver area, consisted of one three-position telephone central office set TC-10, mounted in a ten-ton van, connected to the Tyndall Field Exchange by nine trunks and to Aggressor Force Headquarters by one long local. Approximately one hundred local extensions were installed on this switchboard. To improve the quality of transmission, repeaters were installed on all nine trunk circuits. In addition to these facilities, one leased circuit from Tyndall Field, Florida, to Fort Sam Houston, Texas, was installed for administrative telephone traffic. The land-line teletype installation at Director Headquarters consisted of one ACAN circuit to Atlanta, Georgia, and three Western Union circuits to New York City.

The theater headquarters administrative radio net was comprised of three stations: Theater Headquarters at Fort Sam Houston, utilizing fixed station equipment; San Jacinto Ordnance Depot, the Port of Embarkation used an SCR-399 and Director Headquarters on the beach near Panama City, used an SCR-399. During the period that the convoy was en route, the Commander Expeditionary Troops was in this net using the fixed equipment on board the USS Taconic. Administrative traffic was also transmitted by radio teletype between Fort Sam Houston and the USS Taconic using AN/MRC-2 equipment at Fort Sam Houston and the Navy equipment on board the Taconic.

Two command nets were established in the maneuver area, one operating CW, the other Voice. These nets comprised four stations: Commander Expeditionary Troops Afloat; Commander Landing Force Armored; Commander Tactical Air Command and Director Headquarters.

The amphibious maneuver Exercise Seminole, on the beaches south of Panama City, Florida was the first joint Army-Navy-Air operation since the merger of the Armed Forces. The principal landing forces were a simulated infantry division, and the Second Armored (Hell on Wheels) Division.

Rear Admiral Ralph O. Davis commanded the Joint Expeditionary Force. His nine ship convoy's command ship had communications facilities equal to those of the most powerful broadcasting stations ashore.

Observers of the exercise represented British, Canadian and Australian military services, Army, Navy and Air Force staff schools, the Army's Organized Reserve Corps, and various State National Guard units.

The Commander Landing Force Infantry was a simulated station within this net.

The signal equipment of the participating units was waterproofed prior to embarkation, but inasmuch as the maneuvering units remained on the beaches for so short a period before loading for the return to the port of embarkation, the signal equipment was not de-waterproofed until the units arrived at San Jacinto Ordnance Depot on the return trip.

Some difficulties were experienced during the planning phase of the exercise, the greatest being the lack of signal personnel within the participating forces, thus preventing complete signal liaison with Theater Headquarters during this phase. Another major difficulty was insufficient time available to train signal personnel assigned to participating units just prior to the exercise.

The exercise emphasized the following conditions that must be considered in planning any future exercise of this nature:

a. Signal liaison personnel from participating units must be assigned to Theater Headquarters during initial planning phase.

b. The necessary qualified technical personnel to fill or augment organizational T/O positions must be assigned to units sixty days prior to the date of exercise.

c. Complete organizational T/E equipment plus any additional equipment which is to be used must be available to the organizations for training purposes sixty days prior to the date of the exercise.

Letters TO THE EDITOR..

Sir:

"In reply to your letter of 22 October 1947, regarding inactive duty credit for reserve officers who are studying and working on problems for the Signal Corps, the Department of the Army has prepared a study which involves active and inactive duty credit requirements for the promotion of officers in the Reserve Corps.

"The above study has been submitted to the committee for Chief of Staff on National Guard and Reserve Affairs for review and recommendations. This study includes the proposed inactive duty credits for such studies and problems as mentioned in your letter."

BRIG. GEN. W. O. REEDER
Deputy Chief Signal Officer

Sir:

". . . Best of luck on your combined Army-Navy-Air Force circulation deal. It sounds like the logical approach to a distribution problem. Personally I am quite pleased with SIGNALS. In your first year of production I think you have gone a long way. Undoubtedly other people have told you the same."

BRYANT C. ROGERS
Advertising Manager
Eitel-McCullough, Inc.

Sir:

". . . For days now the flag makers have been turning out thousands and thousands of the new India flags. Turning them out and selling them at a terrific rate. And each day more flags have been in evidence about the city. It began to seem by yesterday that there couldn't be another square inch left on a building to stick another green, white and saffron banner. We estimated that on some of the apartments along Marine Drive there must be at least 5,000 flags on one building —all blowing briskly in the breeze off the Arabian Sea.

"Every car had at least one flag. Most had several fairly large ones. But we saw one British car with a flag about 2 inches long—just about the measure of his enthusiasm I imagine. Then there was a tiny little Indian car that had a flag in front so large you could hardly see the car. Even bicycles had flags. One fellow peddling down the crowded maze of Hornby Road had a staff on his handle bars and three rows of flags running up to the top, around which he was desperately trying to peer at the traffic. Even our own compound had flags flying, especially over the swimming pool. Occasionally one saw the new Pakistan flag, but only in the Muslim areas. However, we did see one gharry driver who had fastened both an India flag and Pakistan flag atop the bridle of his horse.

"The actual transfer of freedom as you know occurred at midnight last night, August 14-15. We were very happy to have been invited to a small Indian party at the home of Lady . . .

"As we drove down thru the Fort area, the city was ablaze of lights. Every building was outlined in bulbs. Trams went thru the streets lit up like Christmas trees with hundreds of riders shouting slogans. Before going over to . . . . we had been to a reception at the Taj, from where we could see all the ships in the harbor decked out with pennants and lights. Only the Gateway of India was dark and sombre. Promptly at twelve we went outdoors. Every vessel in the harbor had its whistle tied open. Over at the Secretariat the Union Jack came down for the last time and up in its place slowly rose the flag of a new, free country. We were at Colaba point, directly across from Malabar and Government House. Suddenly from across the water fireworks began to light up the sky. One could almost imagine the ghosts of generations of governors and viceroys frowning down from the last citadels of an Empire. Today, down on the Maiden the British paraded, perhaps for the last time. I saw the guard march past in front of Buckingham palace, I saw the Tommies parade in Paris in 1938, I saw them in Delhi on V-E Day. You have to hand it to them—they might be on their way out, but they marched with the same spirit and pride today as they did on any day of victory."

A Member in India
(Written 15 August 1947)

(Editors note: An interesting booklet was received with this letter on the political outlook in India which will be sent to any member requesting it.)

Sir:

"On the first day of the new year I wishes you from the Netherlands all goods for you, your family and your Association, too. The war is happy ended. At least here we also were liberated from the Germans by the USA and Canadian Army. Thanks, thanks, for all they have made for us. They have saved us from a real hunger death. Now we have to know we are a poor people. We must work hard to become the old place on the world.

"I am also a ham. But by the war I am suffered almost all of my radio possessions. My receiver, tubes, parts, speaker, amplifier. At this time we can't buy in the USA. Here in our country there are no good parts to buy. We must export to buy food in other countries, especially the USA. I should like to build myself a ham receiver. To listen to the 10-20-40 and 80 mc band again. May I ask your association to help me a bit? Is it not possible to collect some parts to send me this so I could build me a receiver? Of course yau may find some used parts—tubes. I shall appreciate it greatly when you will do something for me. I am a teacher here on a boys school. Besides this I give lessons to the farmers here in Agriculture, especially in wintertime. So I am very busy in wintertime. But for my hobby I can always find some time. Dear friends, I hope you may not think I am a beggar. But at this time, in my case, there is no other way to ask for help. When you are not able to do it I shall wait until better times comes to buy. I am looking forward for any answer. Already thanks for anything you will do. Greetings from the Netherlands."

(Name and address may be had on request to SIGNALS.)

Sir:

"I believe that we should proudly attach our nationality to any name we adopt or select. There appears to be afoot a movement to belittle the U.S. and its accomplishments, especially its military superiority. Let's put power in the name of the association."

LAWRENCE J. CORSA
"Life Member"

Sir:

". . . Occasionally I meet ex-service communicators who have never heard of SIGNALS, and when I tell them of it and the Association they are very much interested. Other members tell me of similar experiences.

"Can't something be done to thoroughly advertise SIGNALS and the Association? Since a great many members must be 'hams' why not suggest to them that on their QSO-ing they plug the magazine and the Association?"

R. L. SCRIVEN.

Editor's note: We, too, have such similar experiences. But as to advertising ourselves, the usual methods are costly, and we have an inhibiting thing called a "budget." We do think the suggestion as to our "ham" members is an excellent one. How about it "hams"?

Sir:

". . . Enclosed is my recommendation for the name of the association, which I hope is not too late.

"I chose 'Signal' rather than 'Communication' since our Signal Corps technical activities also cover radar pulse work, spherics, infra-red heat, television, etc., which forms transmit signaling information rather than communicational information. To me 'Signal' is a more all-embracing term than 'Communication' and seems more natural to use."

A Member from RCA

Sir:

". . . I was among those appointed in the Regular Army in the June 1947 increment, in grade of Captain, with rank from 19 February 1945.

"My appointment is in the Air Corps, and now that the Unification Bill has been signed into law, many of us are holding our breaths to see what will happen.

"I have met a few of the old AWUTC bunch in Japan. Lt. Colonel Diamond, your old A-4, is now with the Air Defense Section, Headquarters Far East Air Forces, in Tokyo. Col. Duggar is now with Far East Air Materiel Command in Fuchu, near Tokyo, but I have not yet had a chance to see him. Major Cooper, the Motor Officer, returned to the States several months ago.

"Since coming overseas, I have changed my specialty, temporarily at least. Upon arrival at Guam, I was assigned as Executive of the Operations and Training Section of USASTAF Hq. When I was reassigned to Fifth Air Force in Japan, after inactivation of USASTAF, I joined 5th Fighter Command on Kyushu and became Troop Control Officer. In July of 1946 I was ordered in to this Headquarters as Chief, Troop Control, and have since been engaged in activating, inactivating, disbanding, reorganizing and reducing units to meet the changed situation.

"My tour in Japan has been very interesting and enjoyable. Our Headquarters is in a steam heated, air conditioned, seven story insurance building. My quarters are a private room and bath (tile bath, hardwood floors, excellent furniture and a perfect bed) in the Kanko Hotel, which I consider the best billet in Japan, comparable to many of our better class hotels in the United States. To make it even more perfect, our mess cannot be beaten, our Japanese chef having spent 14 years in Paris learning his trade.

"As you probably know, Japan can rightfully boast of some of the most beautiful scenery in the World, only about 7% of the Empire being suited to agriculture. Although the mountains are not nearly as high as those of my native West, there are more of them and they are steeper and more rugged. And, in every canyon and valley there is a good stream, in some of which I have located some nice Rainbow and Eastern Brook trout, transplanted here from the States many years ago. Last Sunday afternoon. for instance, I caught —, ranging from 11 to 21 inches, on dry flies with a 4 ounce rod. They are full of fight and excellent eating, making a welcome addition to our usual frozen foods."

N. F. STRADLEIGH

Sir:

"I was very much interested to learn of the existence of your organization. I had often thought that just such an association was badly needed.

". . . Good luck. Is there anything I can do to help in this splendid undertaking? The need is urgent and acute again in these troubled days."

HENRY HOWARD KAFKA

Sir:

"Thirty four former members of the 51st Signal Battalion met in Oceanport, New Jersey, on December 5th, 1947. This was the second meeting of its kind.

"Minutes of the previous meeting and the roster of those attending were read. The chairman then read a telegram from Brigadier General S. H. Sherrill extending greetings from the Army Signal Association. The chairman also read a letter from General Sherrill commending the formation of this organization. Copies of the July-August issue of "Signals" were distributed. General Sherrill had forwarded said copies for this purpose. This issue carried news of the 51st Signal Battalion and its activities in the days before the last war.

"It was decided upon by those present that a reunion would be held on Friday, 16th of April, 1948. This is the day following the official Organization Day of the 'Battalion.' The affair will be stag and will be held in the vicinity of Fort Monmouth. This applies only to those who served with the Battalion for any period of time from its activation date to September 1st, 1940.

"Anyone desiring to attend this reunion is requested to send a post card, stating name and address. When further details are worked out the information will be sent to all those on the mailing list.

"Those present were: Majors B. E. Small, George Callahan, and Maskell E. Brown; Captains John Glennan, Joseph Beauregard; 1st Lts. Wm. V. Foley, Wm. B. Bennett; Warrant Officers Charles Hughes, J. Jasio; Mr. Sgts. John E. Lowe, Stephen Zeman, Arthur Costa, Phillip C. Schloesser, Clete Bland, Fred Doll, Rose, Wm. N. Rea (Ret.), Ben High (Ret.) Ben Sammons, (Ret.); 1st Sgts. Theodore F. Seymour, Joseph J. Darcy, N. M. Hensley, Kenneth Pearce, Alexander Gardner; Tech. Sgts. Arthur Schaefer, Stanley, Jake McGee, John Austin; Staff Sgts. C. C. Edson; Sgt. Maquire; Mr. William H. Ellis, Mr. Wesley B. Martin, Mr. Thomas Lloyd, and Mr. Couneloy."

WILLIAM B. BENNETT
1st Lt., Signal Corps
Temporary Chairman
51st Sig. Bn. Assn.

Sir:

"My choice of a new name for the Association is 'Ground, Air and Sea Signal Association (GASSA).'

"A different (and usually limited) picture enters the mind of each person when the term "Armed Forces" is used. And, at best, it is a hazy term. Why not be definite and clearly define our scope?"

EARL E. UPP

Sir:

". . . To lose the name of SIGNALS hurts deeply. It was a very appropriate name and one all were proud of.

"If merging of the Services means losing one's identity, as Signal Corps, I'm 'agin' it, as the Reds would say. Nevertheless, if it means progress and efficiency, one must go along.

"The undersigned takes this opportunity to congratulate the entire staff of SIGNALS for a grand job; one you can all be proud of, for it was your untiring efforts and good knowledge of the job to be done which all members are grateful for, I believe.

"If possible, what are the chances of getting names and addresses of members put out in book form?"

JOHN M. RODGERS

(Editors note: Our magazine will still be called SIGNALS. Names and addresses of members may be published later when our financial condition will permit.)

NAVY NEWS

Wire Recorders Speed Navy Inventory Work

Savings in time and manpower have been effected by Navy Supply Corps personnel through the use of magnetic wire recorders for taking stock inventories.

The new system which was originated at the Supply Department of the Naval Shipyard, Norfolk, Virginia, calls for the checker to carry a hand microphone along as he inventories shelves, reading his check into a permanent record for later transcription.

The usual system of taking inventories has been for two men to team for an inventory, the checker calling off the items to a recorder who manually records the counts on inventory sheets. Besides being slower, this system leads to frequent misunderstandings and transpositions of stock numbers, which require time-consuming rechecks of shelves.

In a speed test with the wire recorder, checkers at the Norfolk activity counted 100 items in 15 minutes recorded time. This compares to the previous figure of about 400 items a day using the two-man team.

Navy Using AF Communications

Navy and Marine Corps planes began using facilities of the U. S. Air Force's flight communication system within continental United States about the first of the year.

Aircraft of both services were using the airways communication system of the Civil Aeronautics Administration, which became overcrowded as a result of expanded commercial aviation.

Installation of the necessary interphone, teletype and other equipment to connect all Navy and Marine Corps air stations in the country with the Air Force network was expected to be completed by February 1, 1948. Between January 1 and February 1, simultaneous transmissions were carried over the CAA and Air Force systems for Navy and Marine Corps planes.

After the transfer is completed the Navy will transmit all messages dealing with the movement of Naval and Marine Corps aircraft under Visual Flight Rules (VFR) via the Air Force system. Actual flight control of Navy and Marine Corps planes and the approval of flight plans, however, will remain under Navy jurisdiction.

Continental traffic of Navy and Marine Corps planes under Instrument Flight Rules (IFR) will continue to be handled by the Civil Aeronautics Administration.

Navy Seabees to Have Reserve Unit

The Navy Construction Battalion organization has been authorized to join the Organized Naval Reserve as a distinct unit.

As a result, the war-famed Seabees are assured of development as a specialized reserve force under a program which will provide them with their own training program. The Reserves will help the Seabee Regulars maintain the "Can Do" tradition they established in combat construction during World War II.

The new organized Seabee Reserve will be on a relatively small scale at the start. Plans, however, call for enlarging the organization during the next fiscal year. The Reserve Seabees will be organized into companies, consisting of five officers and 40 men, which will be formed at places where Naval Training Centers are or will be available.

In addition to the 247,000 inactive Seabee veterans, approximately 5,500 Seabees are on active duty at various Naval establishments. Nearly 3,500 additional Seabee personnel are serving overseas at Naval bases, where they are doing maintenance work and are operating power plants and similar installations.

In addition to the new Seabee Reserve program, members of the Civil Engineer Corps, who served as wartime Seabee officers, have established volunteer Reserve units in approximately 200 cities throughout the country.

Test System for Alarm Circuits

A communication system for testing fire alarm and sprinkler lines without interrupting alarm circuits has been effected at the Puget Sound Naval Shipyard, Bremerton, Washington. The system also eliminates the possibility of confusing test signals with actual fire alarms. In addition it makes possible substantial savings in man-hours. A monthly savings of 432 man-hours was realized at one yard.

Two electricians at the shipyard, Ralph C. Klamm and Henry D. O'Brien, received awards for suggesting the system.

Navy's Radar FC Praised

The Navy's use of radar in fire control, and the need for such a use of electronics in the field artillery is pointed to by Lt. Col. L. G. Robinson in an article appearing in the Nov.-Dec. issue of THE FIELD ARTILLERY JOURNAL. He states:

The fertile fields of radar and electronics, successfully adapted to fire control by the Navy are still comparatively unexplored in the field artillery.

The ability to locate targets or to track moving ground targets by means of radar has obvious advantages. Radar location of ground targets is a must if our field artillery expects to maintain the lead position it won for itself during the war. Some progress is being made along these lines at present, but support for the program could be more enthusiastic than it has been.

An electronic means of establishing within the battalion fire-direction center the location of each observer would be another desirable step in bringing fire control in tune with the times. This might take the form of a transmitter or beacon carried by the observer which would cause his position to be indicated on a translucent firing chart. The effect of such a device would be to simplify enormously our conduct-of-fire procedure, to save ammunition, and to make the training of observers much simpler and less time-consuming. The problem of fire control would then be reduced to one of insuring that men are trained in the use and maintenance of the equipment.

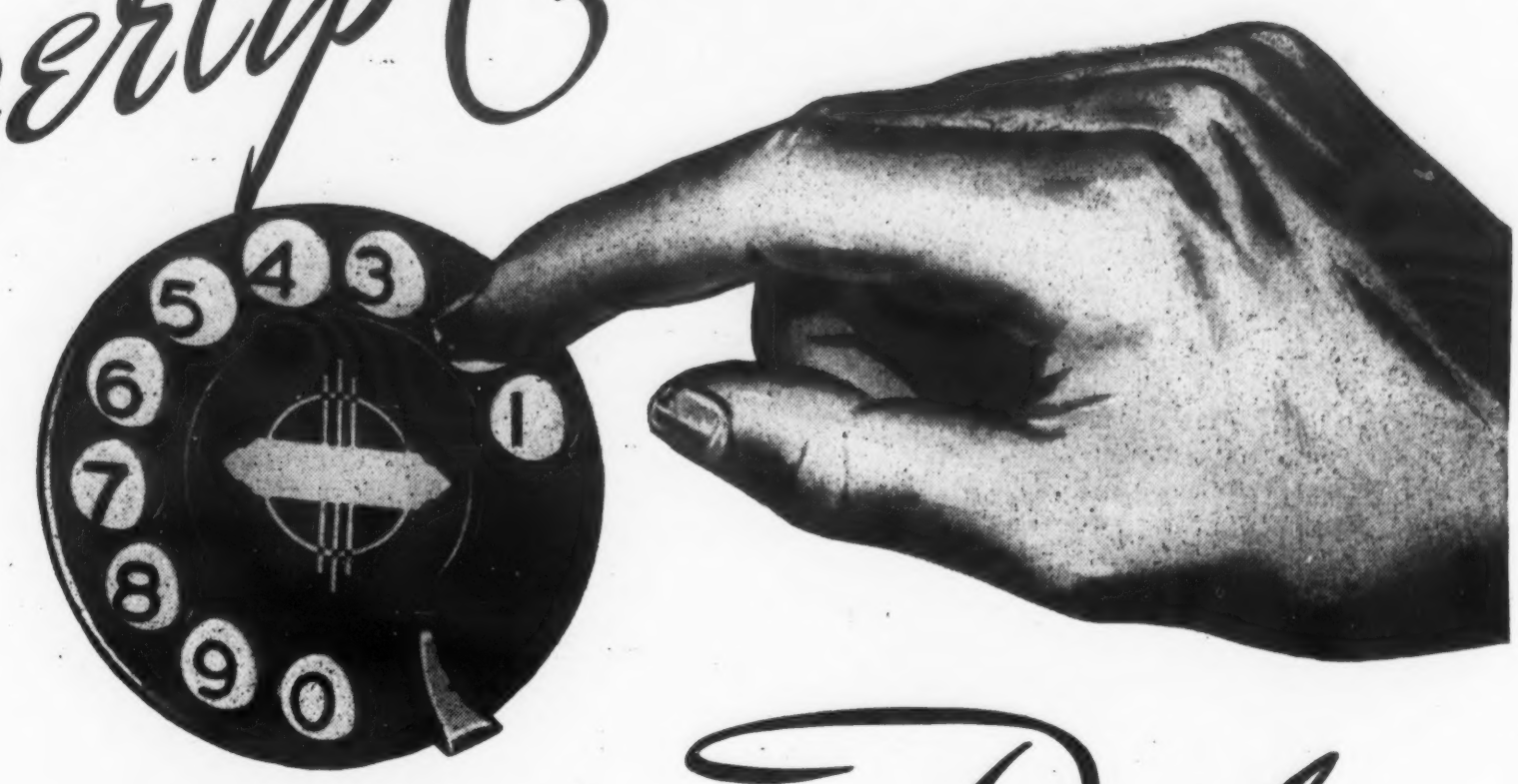
". . . In the meantime, 'The basis of our whole security, under our free democratic government, must be universal military training.'

"The whole world must have the knowledge that we have a body of trained men in the background.

"That's got to be the foundation—it supports the whole superstructure of peace." *Warren R. Austin, America's delegate to the United Nations.*

FOR

Fingertip Control



THE AUTOMATIC ELECTRIC *Dial*

THE AUTOMATIC ELECTRIC DIAL places the supervision of electrical circuits right at your fingertips. Extremely flexible in application, the dial may control a wide range of electrical control equipment. Here are a few of the diverse ways the Automatic Electric dial is serving today:

In radio . . . it controls transmitters remotely —switching them on and off, selecting desired frequency channels, etc.

In aviation . . . it controls airport lighting and traffic signals—switching individual, collective, or group circuits on and off.

In the power industry . . . it's used by a dispatcher to set up indicators, mapping out the switching and distribution system on a supervisory board.

The flexibility of dial control can very likely be used to advantage in YOUR application, simplifying operations by using the Automatic Electric dial and associated control apparatus. Competent engineers will give capable attention to your inquiry.

The Type 24 Dial is a compact, high-speed impulsing device, accurately adjusted to transmit 10 impulses per second by means of a pair of impulse springs. Impulses may momentarily close an open circuit, or interrupt a normally closed circuit. To control auxiliary circuit operations, dial may be equipped with "shunt" springs in various arrangements.

AUTOMATIC ELECTRIC

Makers of Telephone, Signaling and Communication Apparatus
Electrical Engineers, Designers and Consultants
Distributors in U. S. and Possessions:

AUTOMATIC ELECTRIC SALES CORPORATION

1033 West Van Buren Street Chicago 7, Illinois

AIR FORCE NEWS

AF Reviews '47

In a review of 1947 operations Air Force communications for the year were seen as being centered mainly on gearing the world-wide, war-time communications network to the requirements of peace-time operations. One of the main achievements was the maintenance of continuous communication by radio between Washington and a flight of B-29's which flew from Tokyo to Washington on Air Force Day. Never before was air-to-ground and ground-to-air radio-contact maintained over such a long distance. Utilizing the equipment from this test, Air Force strategic air commanders can now exercise direct and instantaneous control over their bombers and fighters while such aircraft are in flight anywhere in the world. This is made possible by the development of what is known as a "rotary-beam parasitic array antennae" which can be rotated to point in the direction of a plane and "follow" it in flight.

A revitalized Ground Controlled Approach (GCA) program, recovering from the heavy loss of trained personnel during demobilization, was initiated which called for GCA units at 72 locations in a long-range plan. At the end of the year, 32 sets were operating in the continental United States and 20 sets overseas. During 1947, GCA units brought in more than 75,000 aircraft, and 372 of these landings were listed as emergency "saves."

The USAF also furnished the Coast Guard with two GCA units, necessary replacement parts, and crews to train Coast Guard personnel in GCA operation.

All Air Force radar GCA installations were placed at the disposal of civil aircraft in cases of emergencies as a result of agreements between the USAF and the Civil Aeronautics Administration. CAA approved GCA as a primary landing aid at Anchorage, Alaska, and Shamya, Aleutian Islands.

Another announcement of 1947 was the APS-10, called "the poor man's radar," a small, light-weight navigational instrument which will be standard equipment on all new transport aircraft. Air Transport Command planes now use the APS-10 on all overwater flights.

High Altitude Tube

A new vacuum tube design for use on high voltages at altitudes up to 60,000 feet has been announced by the Amperex Electronic Corporation. The development work was sponsored by the Air Material Command of the U. S. Air Force and the tube is especially important in control circuits of guided missiles. Base of the tube is of gluass and is tapered and ground to fit the socket like a glass bottle stopper. This construction excludes all air which, at high altitudes, causes flashover between terminals.

Wire Laid from Aircraft

An innovation in the setting up of communications was displayed in an exercise staged by the 9th Air Force at Fort Benning. A low flying C-47 flew over a target area and laid approximately 3,000 feet of telephone wire. Within a few minutes communications technicians, landed earlier by parachute and glider, had a telephone conversation taking place over the wire reeled out by the plane.

AF Loses Radar Bases

In the withdrawal of U. S. Forces from Panama the USAF gave up 13 radar bases. These were MEW (microwave early warning) stations, each with a landing strip able to handle fighters and light bombers. With the return of the radar bases to the Panamanian government by the US AF, radar warning stations for the defense of the Panama Canal can be maintained by Navy "picket" vessels operating in the Canal area.

C82 Drops Heavy Artillery

The 75mm pack howitzer and the 105mm M2 howitzer have both been successfully dropped from the rear door of the C82, the 75mm using one 92-foot parachute and the 105mm using two of them. Using this means of exit from the airplane, it is possible to eliminate the necessity of breaking the 75mm howitzer into its various loads. The entire howitzer can leave the plane in one load, with the howitzer crew following immediately. The results of these tests almost certainly assure that the rear exit will become standard practice within a short time.

Facsimile Reception in Flight

The Air Force is planning to use facsimile equipment on aircraft, so that airplanes in flight can receive maps, pictures, and reports. Arrangements are being made to give a full report on this interesting development in a near future issue of SIGNALS. It is hoped that the next issue will carry such an article.

All-Weather Flying

On the 40th birthday of the Air Force, August 1, the All-Weather Airline, flying a route between Andrews Field, Maryland, and Clinton County Air Base at Wilmington, Ohio, completed a year of daily operation in all types of weather, every flight having been made on instruments.

"I am very favorably impressed with the administration of the pilot program. Frankly, I subscribe to such a program as contemplated by UMT. It is a program which will make for better academic performance by those who continue their education." *Theodore W. Biddle, Dean of Men, University of Pittsburgh.*

". . . Certain possible precautions would be scientific, others organizational. But of one thing I am sure, if such a devastating attack should be made upon us, an enormous asset to us would be the military discipline and training of our citizenry. With such training, our population could move to make the best of the situation, and organize to strike back; without such training we might stay in a state of hopeless confusion, an easy prey for the next stage of the attack. If I were the mayor of a city, or the Governor of a State, or the President himself, I would value training in mobilization, discipline and concerted action of our citizens in such a time.

"If we should suffer such an attack, the next stage would be actual invasion of our country for purposes of occupation. This, and not the bombing, would be defeat. Our country is so big, that we should have a chance to resist invasion even then, if we were prepared with munitions, and could cal lto arms very quickly an adequate army, which did not exceed six months' or a year's training before it could function. This is a grim picture. But this is what we want insurance against—to prevent its happening if we can, to be able to survive if we must." *Dr. Karl T. Compton, President of Massachusetts Institute of Technology.*

Signal Corps News

Munitions Board Communications and Electronics Equipment Committee

THE MUNITIONS Board Inter-Agency Communications and Electronics Equipment Committee, which was recently established by the Munitions Board, is actively engaged in preparing a program to assist the Board in the development of a co-ordinated industrial demobilization plan related to and dealing with communications and electronics equipment. The development of such a plan will present many complicated problems, the solution of which will require assistance and expert advice from industry. The field must be considered in its broadest scope, from raw materials and components to completed end items, and from material processors to final assembly plants. As the program develops and problems are revealed the Committee plans to present those deemed appropriate to other appropriate associations and the Armed Forces Communications Association for consideration and advice.

One of the most important functions of the Committee is to provide a common meeting ground for planners from all services interested in this type of equipment. This will do much to insure that the industrial mobilization planning for communications and electronics equipment of all three Services of the National Military Establishment is fully co-ordinated.

The chairman of the Board of the Committee is Col F. W. Kunesh, Signal Corps.

SC Educational Program

IN conjunction with Rutgers University, a graduate educational program of advanced mathematics and electrical engineering is being offered qualified civilian employees at Fort Monmouth, Signal Corps post in New Jersey. According to Major E. S. Thurston, Chief, Civilian Personnel Branch, 47 candidates have already been accepted by Rutgers for the courses which will lead to an MS degree. All classes will be held in the Fort Monmouth area.

German Magnetophone

A GERMAN Magnetophone, K-7 Model, has been obtained by the Signal Corps and its military characteristics for both field and fixed station equipment are being evaluated by the Coles Signal Laboratory at Fort Monmouth, New Jersey.

According to Charles C. Comstock, Chief of the Recording Equipment Section, no original development work is in progress at present but several changes have been effected including a conversion from 50 to 60 cycles.

Of interest to commercial concerns in the United States is the prospect that the set would serve as a useful device in radio particularly as a check on the fidelity of an original broadcast. By using the magnetophone it is considered possible that a delayed broadcast could be as successful as an original broadcast.

The K-7 Model is the Allgemeine Elecktrizitate Gesellschaft (AEG), designation of a new equipment currently in production. It is believed that only a few prototype models have been completed. No circuit diagrams have yet been obtained.

Hornung

THE Legion of Merit has been awarded Lt. Col. Herbert K. Hornung, Signal Corps, for outstanding war services as Signal Officer, 90th Infantry Division.

The citation reads in part: "He displayed outstanding ingenuity in improvisation and organization and a high degree of professional skill in maintaining communications within the Division in its night crossing of the flooded Moselle River against a fortified position, its operations beyond the bridgeless Saar River and in the Ardennes, its penetration of the Siegfried Line and its advance to the Rhine. This was an important factor in the success of the Division."

Radar Training

OF INTEREST to Army instructors at colleges and other educational institutions, is a recent announcement by the Federal Communications Commission regarding the use of radar equipment for training purposes. The Commission warned of the possibility of interference from radar transmitters to the recognized radio services and also pointed out the necessity for securing both station and operator licenses before starting operation of such equipment.

In the main, the FCC said, these equipments have been obtained from WAA surplus military stocks and are to be used in connection with the training of engineering students on radar techniques. The FCC pointed out that the surplus radar equipments are war-born devices, designed from a standpoint of military expediency and not necessarily engineered to operate on frequencies in accordance with the FCC table of frequency allocations.

Recently the Commission granted the first authorization to an educational institution to use radar equipment for training purposes. West Virginia University received special temporary authority to operate a radar station to train students in the theory and operation of radar equipment.

Active Duty Training

FREQUENT INQUIRIES are being received in the Office of the Chief Signal Officer from Signal Corps Reserve Officers relative to active duty training available at Signal Corps installations.

The program for such training has been published in letters of the Commanding General, Army Ground Forces, under date of December 24, 1946, June 2, 1947 and July 14, 1947. Quotas are authorized for active duty training during the fiscal year 1948 at the following Signal Corps activities: Office of the Chief Signal Officer, Signal Corps Photographic Library and Laboratory, Signal Corps Photographic Center, Plant Engineering Agency, War Department Signal Center and the Alaska Communication System.

The ordering of Signal Corps personnel to active duty training is the responsibility of the Commanding General of the Army Area in which an officer or enlisted man resides and individuals desiring such training should make application to the Senior Instructor of the ORC in their local district. The training period is from 15 to 90 days.

High-Speed Lens

THE FASTEST known high-speed all refracting photographic lens has been developed by the Signal Corps Engineering.. Laboratories at Fort Monmouth, N. J., according to a recent announcement from the Office of the Chief Signal Officer.

The relative aperture system of the new lens can be made as large as f/0.6, approaching the theoretical maximum of f/0.5. The lens, developed by Edward K. Kaprelian, Chief of the Photographic Branch at the Squier Signal Laboratory, has six elements, or separate "lenses," made of at least four different kinds of glass. Neglecting reflection and absorption losses, the image produced by this lens is about two-thirds as bright as the object. The f/0.6 is eleven times as fast as an f/2 lens and is about six times as fast as an f/1.5 lens, the fastest lens ordinarily used in "candid" cameras, and other photographic devices requiring fast lenses.

The lens is used in making photographs under conditions of extremely low light level and is particularly suitable for making motion pictures of x-ray fluorescent screens and of cathode ray tube traces.

Joint Communication Procedure

THE U. S. Armed Forces have agreed on a joint procedure for handling Army, Navy, Air Forces and National Defense message communications by tape-relay, the Department of the Army announced. This procedure was established to facilitate the handling of message traffic by the interconnected communication systems of the three services.

The Joint Tape-Relay procedure, which establishes a uniform method of message handling over facilities operated by the Army, Navy and Air Forces, became effective on a world-wide basis on December 1, 1947.

The decision to adopt a system of message handling over teletypewriter circuits by means of reperforated tape results from experience gained during the war when manual facilities proved inadequate. Difficulties also arose when each service used different methods of operation which sometimes resulted in delay when messages were interchanged. Under the new procedure this drawback will be overcome.

In order to indoctrinate operating personnel with the principles of the new procedure, the Signal Corps recently conducted a three-week course of instruction for field instructors. Field instructors from each Army Area and Major Overseas Command together with representatives from the Navy and U. S. Air Force attended the exercise. The instructors were key personnel from the Army Command and Administrative Network, Air and Airways Communications System and Navy Teletypewriter System who conducted similar training problems through their respective commanders in preparation for the activation date of the new Joint Tape-Relay procedure.

The Signal Corps tape-relay exercise was held in the Pentagon under the supervision of Col. W. T. Guest, Chief of the Army Communications Service Division.

Kelsey

THE Legion of Merit has been awarded Col. John E. Kelsey, Signal Corps, for outstanding services as Signal Officer of the fourteenth Corps from May 1945 to January, 1946.

The citation reads, in part: "He demonstrated exceptional technical ability and resourcefulness in maintaining a superior communications system during operations against the enemy on Okinawa. He subsequently rendered outstanding services in overcoming numerous personnel and material handicaps incident to the successful establishment of an extensive and permanent telephone and telegraph net in Korea."

Award to Colonel Schroeder

COLONEL Henry J. Schroeder, Signal Corps, has been awarded the Legion of Merit for outstanding service as Chief, Personnel Division, Command and General Staff School, and as Assistant Commandant, School of Personnel, Command and Staff College, from February 1943 to April 1947.

Alaska Training Program

ABROAD winter training program to indoctrinate personnel in operating procedures and in the use of equipment has been inaugurated in Seattle by the Alaska Communication System. Courses are being given in Basic Signal and Cable Equipment, Radio and Teletype Operation and Radio and Teletype Maintenance. The program is under the direct supervision of Major Joyce B. James, Chief, Personnel and Training Division.

Signal Corps Makes Excess Profits Recovery

A TOTAL of 3,110 renegotiation assignments have been handled thus far by the Signal Corps, and of this number excessive profits were recovered from 1,362. The total gross refunds of excessive profits recovered by the Signal Corps are estimated at $480,000,000, with a net recovery of $265,000,000 after deducting the estimated credit granted contractors for Federal income and excess profits taxes that had been paid on the gross recovery. The above was accomplished with an estimated total expenditure by the Signal Corps of $1,275,000 which represents 0.27 of one per cent of the gross refunds and 0.48 of one per cent of the net refunds.

Red Tape Reduced

MORE than 200,000 different official forms were in use by the Armv Service Forces when a determined standardization and reduction program was instituted in 1944. Within eighteen months the number of forms had been reduced by 72 per cent and the Signal Corps had effected a reduction of 82 per cent or 16,249 forms, the highest percentage among the Technical Services.

The Army's program was directed by the Forms Standardization Section, AGO, which is continuing its efforts toward economy, simplicity and high functional value. The Signal Corps reductions were effected by the Forms Standardization Unit.

Cover

COLONEL E. C. Cover, former Personnel Officer, Procurement and Distribution Division, Office of the Chief Signal Officer, has been named a member of the Board of Governors of the Longwood School for Boys at Olney, Maryland. After his return to inactive status last year Colonel Cover resumed his association with the Chesapeake and Potomac Telephone Company in Washington.

"We have learned once and for all that we cannot insulate ourselves from the rest of the world. We know now that in helping other peoples to reestablish that economic and political stability which alone can make them truly free peoples, we are in that way safeguarding our own freedom"—*Secretary Symington.*

SD Safety Program

By Mark Harriss

Safety Director, Sacramento Signal Depot

FLASH THE MESSAGE OF SAFETY: Safety is defintely a part of National Defense and predaredness. Here at the Sacramento Signal Depot, we work on the assumption that a job well done, must be done safely. Our safety program is set up to recognize every factor that might cause an accidental injury, damage to equipment, or spoilage of materials. Ahe we getting results? We will let our record speak for itself. Here, you find an atmosphere of safety in every department. Supervisors and workers are looking for unsafe acts and unsafe conditions. Our supervisors are trained in job analysis, and the basic fundamental principles and factors of safety. They recognize existing and potential hazards, and what's more they apply the right remedy.

The Blue-Print of the world-to-be is in the making and must be checked for existing and possible hazards.

What is more important to you than your own safety?

What is more important to happy home life than home safety?

What is more important to full employment than work safety?

What is more important to community welfare than pubic safety?

What is more important to peace and security than National Safety?

The toll of death and serious injuries, due to preventable accidents, has become an important factor in our every day way of living. It is a problem that must be solved, and the best solution is to educate the individual to become safety-conscious and safety-habited. This problem of safety is intimately tied in with your own personal welfare. We have too long looked at saftey as freedom from danger, rather than safety for our own welfare and happiness. It is time we realized this and started to do something about it. People don't get hurt because they are dumb, rather it is because on one ever took the time, or the trouble, to show them what was done wrong when an accident occurred.

We need a common-sense type of safety education—the kind that tells us what we need to know, gives us the proper instructions, makes sure these instructions are understood, and then follows up to see that everything is going according to plan.

Industrial College Training

THE Industrial College of the Armed Forces has started a series of two weeks' training courses for Reserve officers, educators and executives of industry.

The purpose is to foster interest in problems incident to economic mobilization, so that in the event of a future emergency those who attend the courses may have an understanding of the fundamental problems that will confront the nation. The course will be divided into two phases. The first phase. to be given to Reserve officers only, will be a summation of current military matters, providing the student officers with up-to-date information concerning the latest thought in military concept, planning, organization and regulations. The second phase of the course, to be given to Reserve officers and offered to industrial executives and educators, will consist of instruction in basic problems of economic mobilization, including procurement planning, economic warfare and industrial mobilization. The Army and Navy Munitions Board has been invited to participate in that part of the instruction which is concerned with the Industrial Mobilization Plan.

The courses will be given by a specially trained group of about seven Army and Navy officers from the faculty of The Industrial College of the Armed Forces and will be modeled after the complete course of instruction now being given at the College. The course will cover two five-day weeks; and *will be conducted in areas which have a heavy concentration of industry.* Plans called for courses to start in New Orleans, in January 1948, Birmingham, in February, San Francisco, in March, New York, in April, Pittsburgh, in May, and Chicago, in June.

* * *

A directory of the membership of the "Fellowship of U.S.-British Comrades" and a copy of the quarterly is available at our offices, upon request, to the first interested member whose application for it is received. The "Fellowship" was established "to perpetuate, develop and extend the United States and British fellowship which began in the combined and integrated headquarters and staffs of the combined commands, in each of which United States and British men and women, serving during the Second World War under a single commander, worked together in the cause of freedom."

Recorder Bargain for Members

An opportunity for any member of the association to acquire a tape recorder of reputable manufacture at near factory price has been made possible by Member John E. Medaris.

Mr. Medaris, through a group of his own, the "Conversation Club," has arranged with the Brush Development Co. to procure recorders at the unusual price solely for Armed Forces Communications Association members.

The model made available under this arrangement is the Brush Magnetic Ribbon Recorder-Reproducer, model BK401. Following are the prices for recorder, tape, and extras.

Recorder:	(Reg. $229.50)	$160.65
Tape:	(Reg. 2.50)	2.10
Carrying Case:	(Reg. 29.50)	20.65
Extra Reels:	(Reg. .65)	.65

Shipment will be made "collect." Reorders of supplies will be mailed postage paid. Address all orders, or inquiries, to Conversation Club, P.O. Box #90, Washington, D.C.

Campus Radio Station

A UNIVERSITY of Maryland radio club, open to all "hams" and others interested in establishing an amateur radio station at the University of Maryland, College Park, Maryland, has been formed by the Signal Corps unit of the Reserve Officers Training Corps, according to Colonel Sidney S. Davis, Signal Corps commanding officer. No fees are required of members and all equipment will be furnished by the Signal Corps. The "ham" station as planned will be capable of voice or code transmission and reception.

Magnavox...

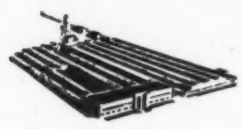
Component headquarters since 1915

FOR more than three decades Magnavox has served the radio industry, specializing in the quantity production of quality components for the manufacturing trade.

Manufacturers know that their finished products can be only as good as the parts they use. To insure dependability, economy and customer satisfaction, they insist upon Magnavox components—long established as the highest standard of quality.

Over 100 different speaker models are made to supply every possible production need. Capacitors and other component parts are highly perfected and standardized into container sizes right for every type installation.

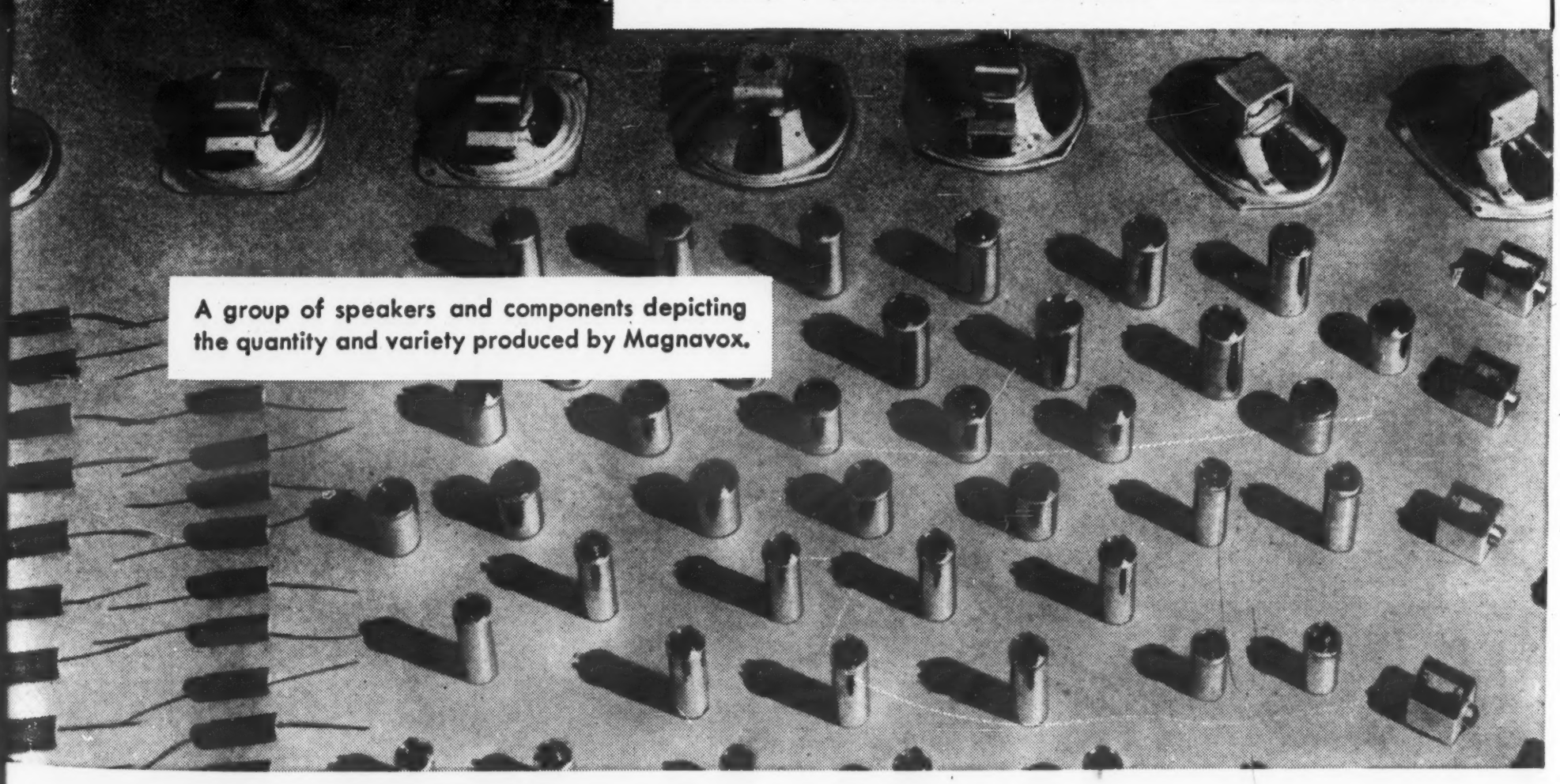
In the modern, six-acre Magnavox plant, experienced engineers and designers stand ready to apply their skills to any of your component problems. When you need loudspeakers, capacitors or other components, ask for Magnavox, and your specifications will be met exactly. There is no substitute for experience! The Magnavox Company, Components Division, Fort Wayne 4, Indiana.



Magnavox

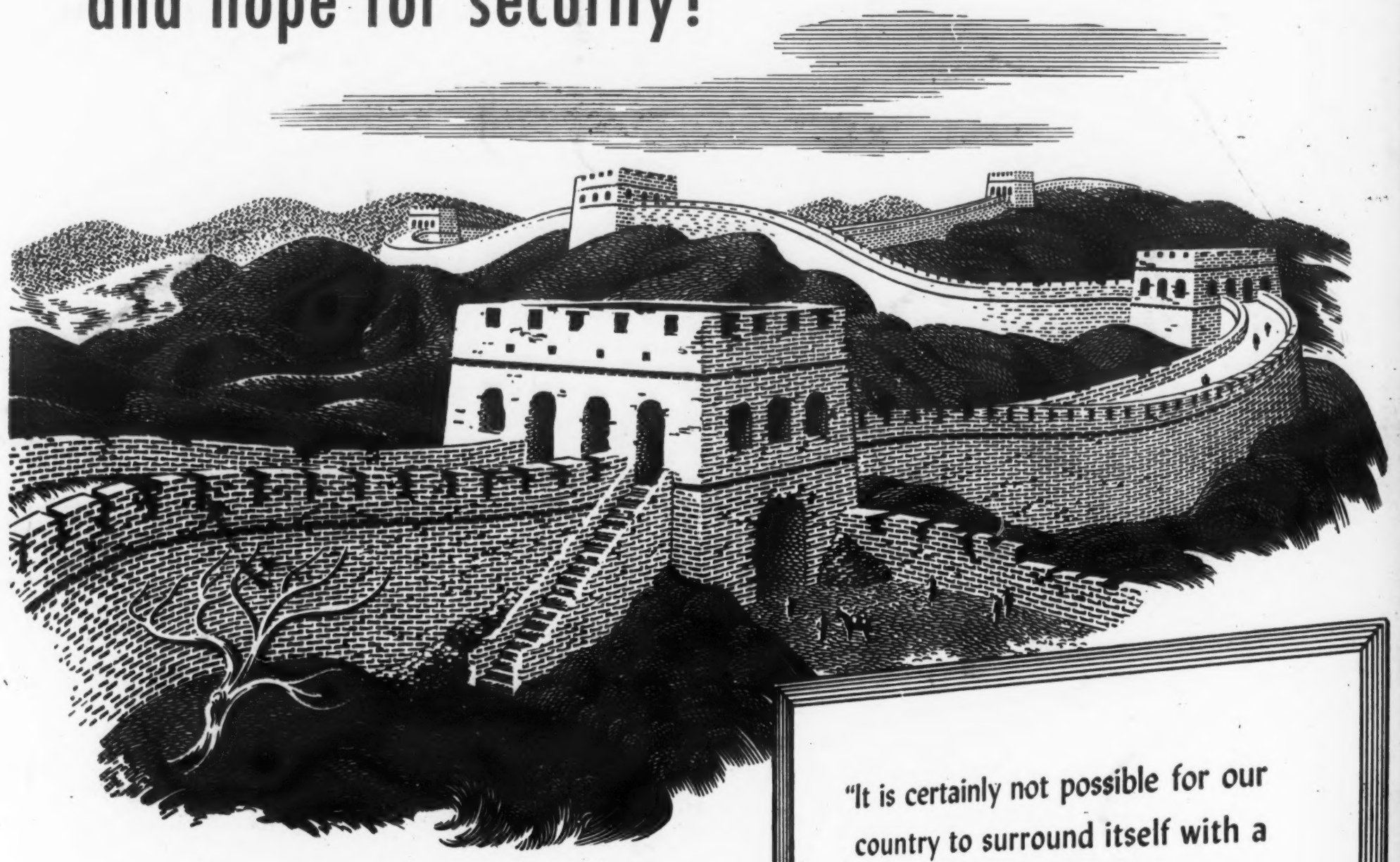
has served the radio industry for over 32 years

SPEAKERS • CAPACITORS • SOLENOIDS • ELECTRONIC EQUIPMENT



A group of speakers and components depicting the quantity and variety produced by Magnavox.

America cannot retire behind a "CHINESE WALL" and hope for security!



The I T & T, America's largest system of world-wide communications, sees world peace largely dependent on world-wide cable and radio communications. Men talking together — knowing more of one another's lives — can get together. Let peoples speak freely to peoples and they will themselves destroy the distrust which keeps men apart who should live together as brothers.

"It is certainly not possible for our country to surround itself with a Chinese Wall. Should we close its gates and refuse our assistance to those nations, crippled and impoverished, who seek our help, we would abandon them to the influence of those who seek to extend their own ideologies and power beyond their borders."

IT & T ANNUAL REPORT, 1946

INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

67 Broad Street, New York 4, N. Y.

I T & T COMMUNICATIONS

I T & T is the largest American system of international communications. It includes telephone networks in many countries, 47,000 miles of submarine cable, 6,600 miles of land-line connections, over 60 international radiotelegraph circuits and more than 50 international radiotelephone circuits.

I T & T RESEARCH AND MANUFACTURING

Associates of I T & T maintain electronic research laboratories in the United States, England and France, and operate 35 manufacturing plants in 25 countries which are contributing immeasurably to the rehabilitation and expansion of communications in a war-torn world.

WORLD UNDERSTANDING THROUGH WORLD COMMUNICATIONS